

SYN-AKE®

*Stop wrinkling,
keep laughing*



February 2026

Peptides | Pharma-inspired skincare

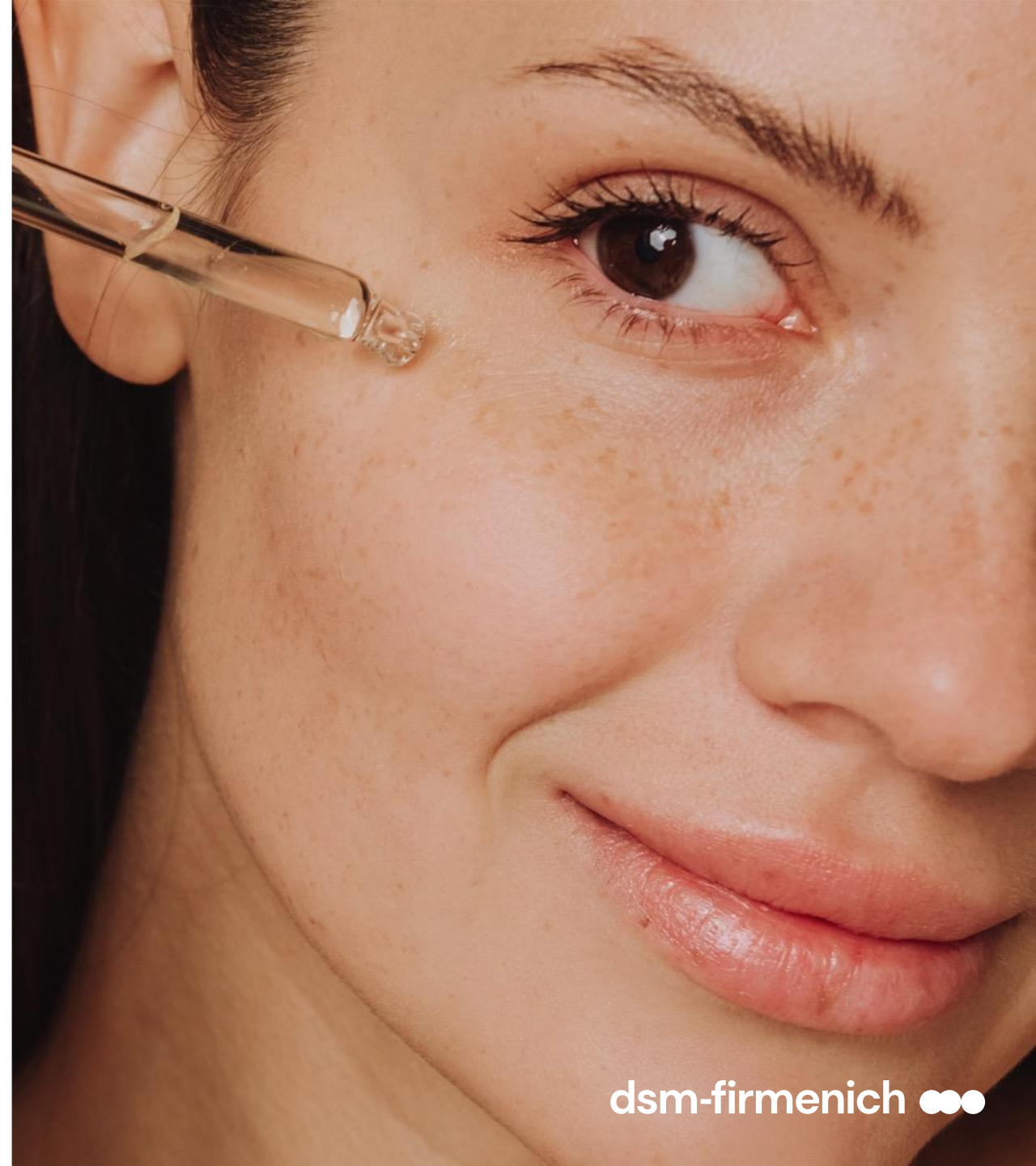


Visibly
reduced
expression
wrinkles

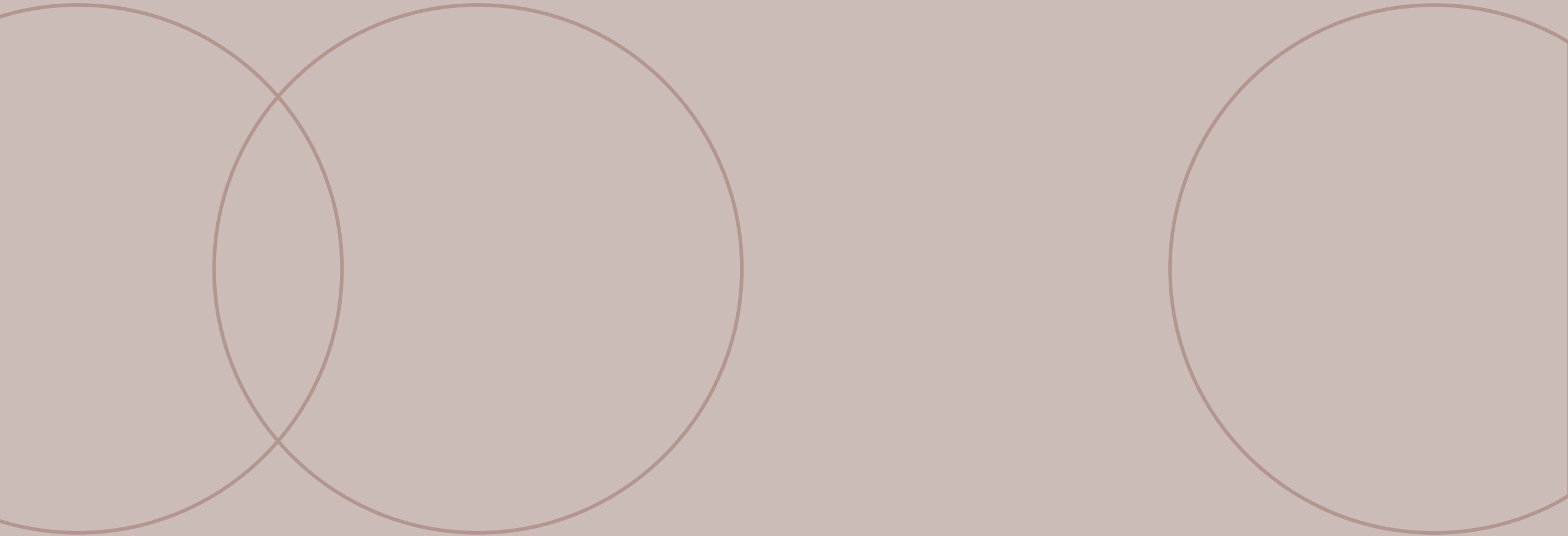
dsm-firmenich 

Agenda

- 1 Market background
- 2 SYN-AKE® all-in-one solution
- 3 Mode of action & in vitro proof
- 4 In vivo validation
- 5 Products Line-up



01 Market background



Well-aging solutions' consumer base keeps expanding

The population is aging

65+ will more than double globally by 2050, representing up to 20% of the entire population

The new generation of mature consumers is more empowered and in control than in the past

The fight against aging starts younger

Millennials started using anti-aging products in their 20s, more than 20 years earlier than previous generations – focusing on preventing, rather than reversing, the signs of aging.

Source: DSM Trend Landscape



“Medical Beauty”

A fast-growing trend

Growing acceptance of cosmetic surgery with opportunities for skincare products to support pre- and post-procedures or to mimic surgical results without the pain and cost.

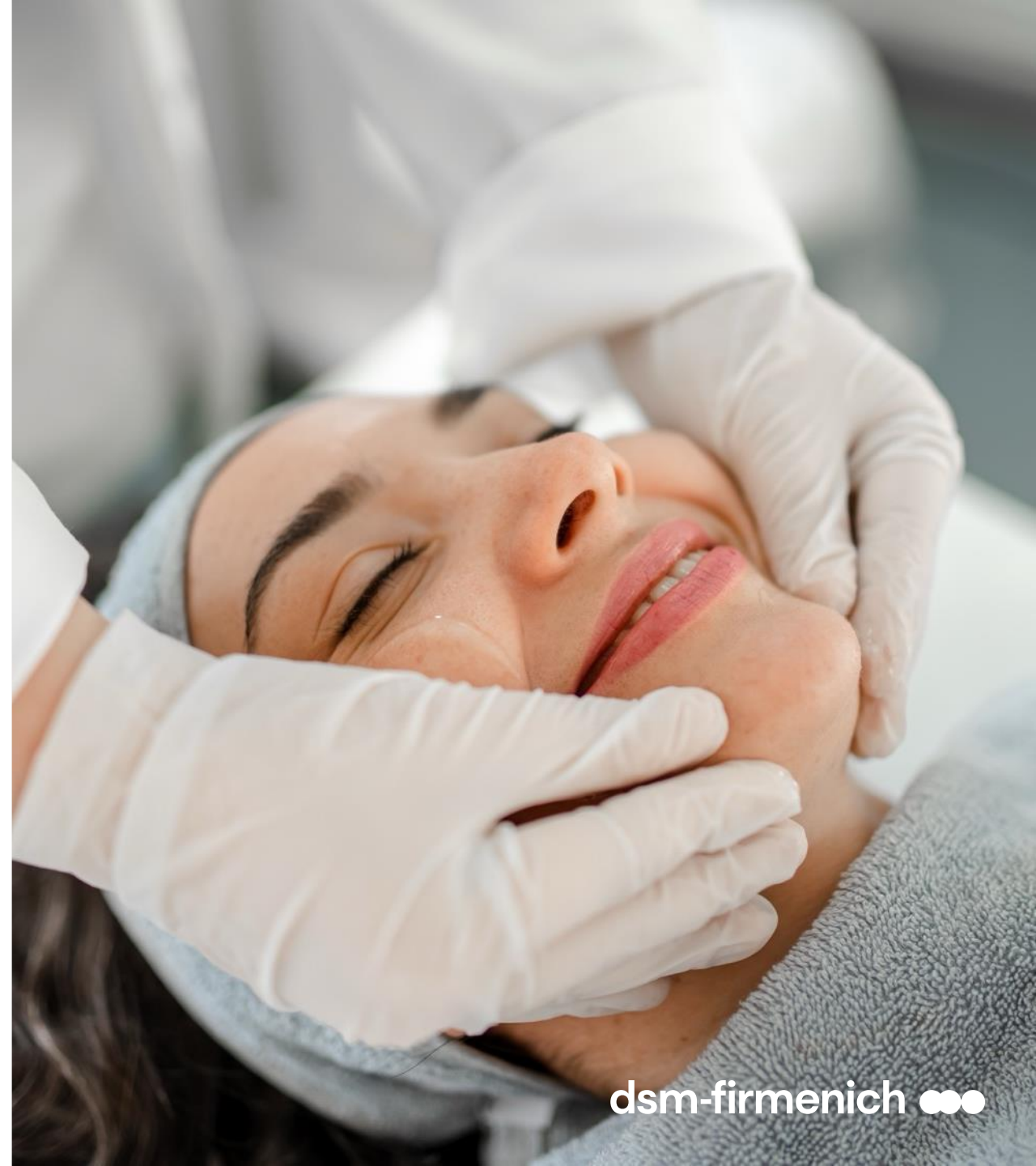
Surgery and beyond:

Clinics’ patients can choose from a wide range of options like surgery and minimally-invasive fillers, peels, devices and treatments. “Preventive Botox” amongst 20-29 y.o. has increased double digit in the past years.

Topical products:

High-efficacy skincare is booming

Source: DSM Trend Landscape

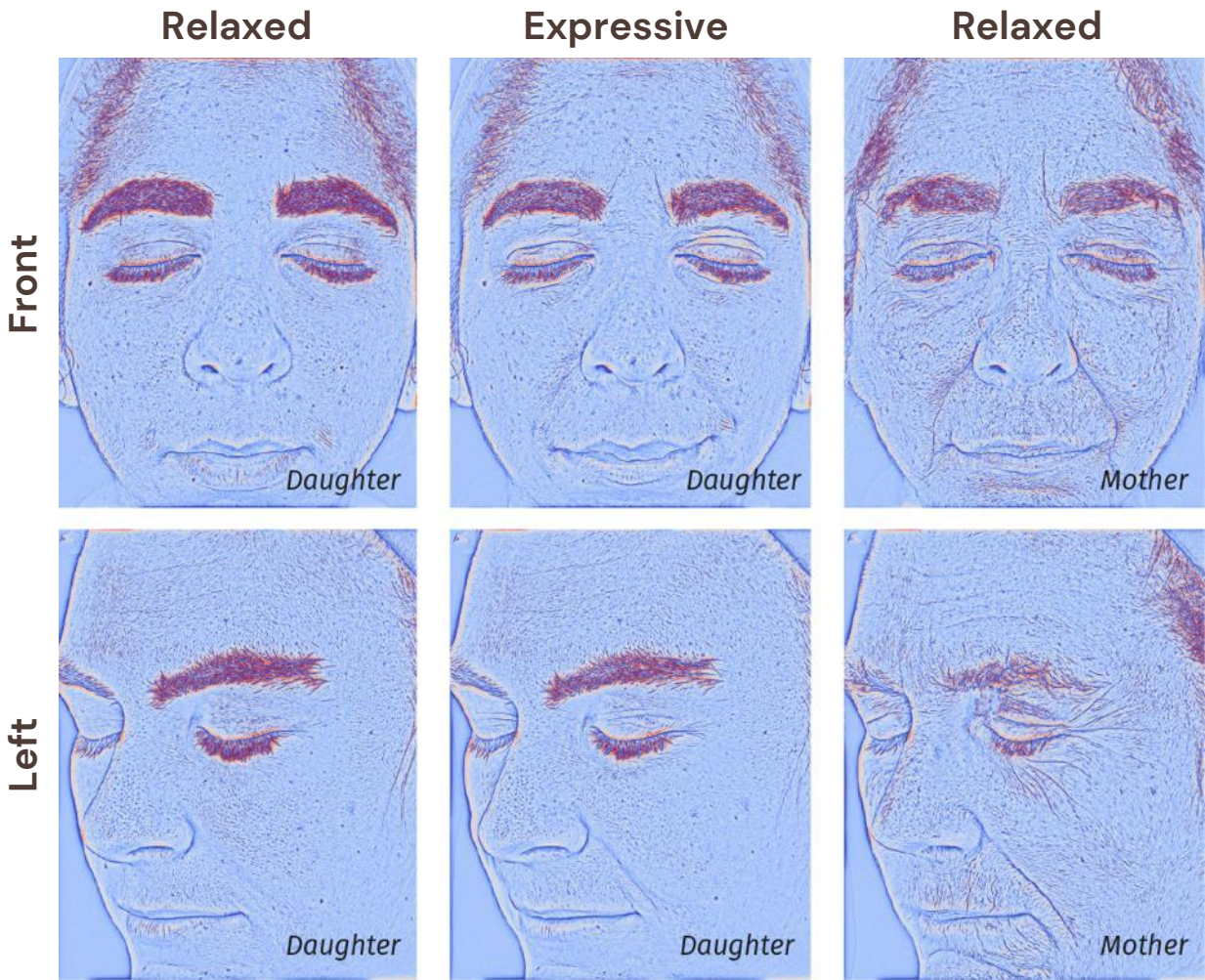


02 SYN-AKE[®], all-in-one medical beauty solution

The background of the slide features a solid brown color. Overlaid on this are four geometric shapes: three large, thin-lined circles that overlap each other, and one solid brown circle located on the right side of the slide.

Wrinkles can originate from facial expressions

Over time, repetitive facial movements can lead to visible, persistent wrinkles



Mimic wrinkles progression

Image transition of relaxed-face daughter to angry-face daughter to relaxed-face mother shows that where daughter only has expression lines related to momentaneous facial contraction, mother already shows persistent mimic wrinkles in relaxed-face mode in the same areas

Volunteer #90 (age 24), Volunteer #89 (age 60)

Volunteer #37, age 21, Volunteer #38, age 56

SKIN CONCERN
Mimic wrinkles

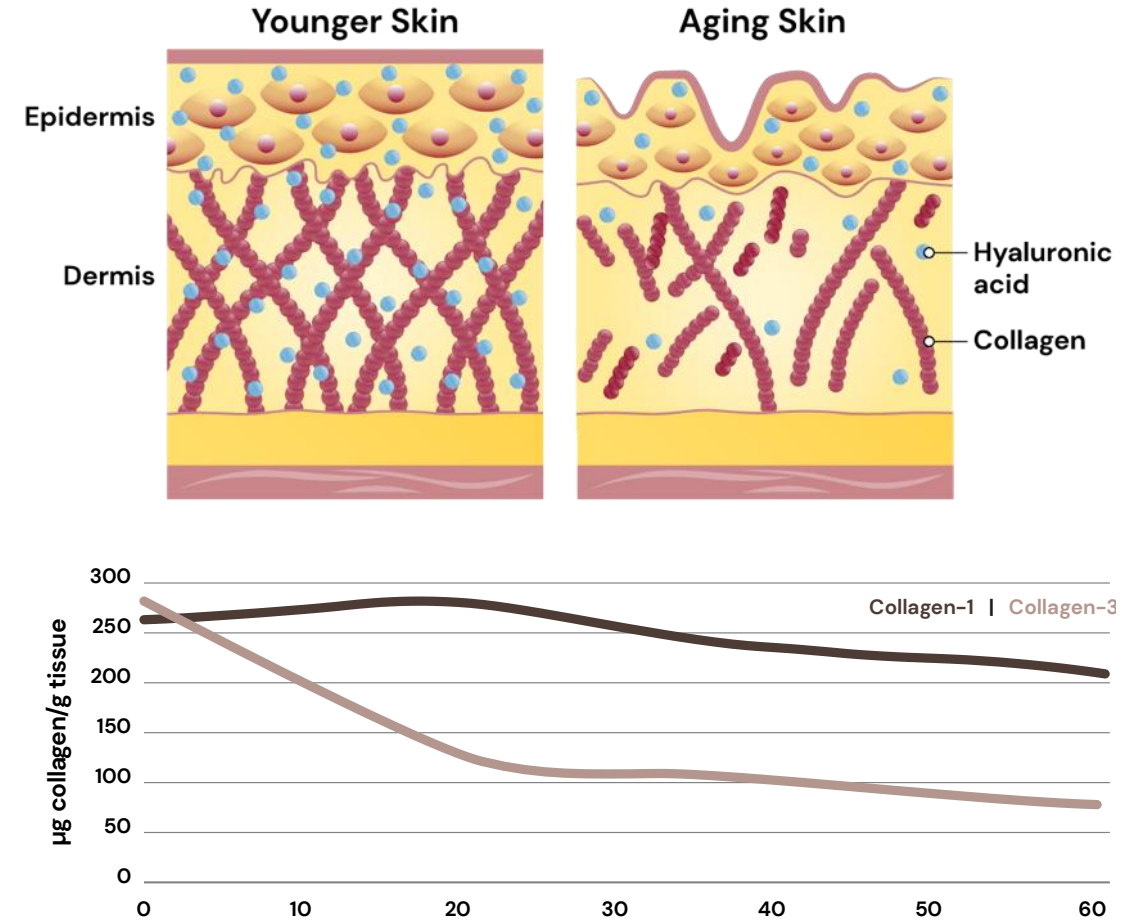
The appearance of deep wrinkles also relates to compromised dermis structure

SKIN CONCERN
Deep wrinkles

Over time skin works less efficiently

Profound changes occur in the structure of the dermis and epidermis over time, through processes of intrinsic and extrinsic aging, leading to deep wrinkle appearance and dry skin:

- With age, the Collagen density in the Dermis decreases and its network becomes increasingly fragmented, presenting shorter and less organized fibers. At the same time, Hyaluronic Acid is degraded. This is also associated with a reduction in dermal thickness.
- An increase in matrix metalloproteinase (MMP) expression accelerates the Collagen degradation. In parallel, the synthesis of new extracellular matrix components by dermal fibroblasts slows down, failing to adequately replace the degraded matrix.



Sebum imbalance can trigger blemishes and inflammation

The face has many sebaceous glands that produce sebum or oil.

Sebum exists to help protect the surface of the skin and helping to retain moisture in the deeper layers.

However, excessive sebum production can result in oily or greasy skin and can cause congestion and enlargement of pores, inflammation, and ultimately lead to skin conditions like acne and breakouts.

SKIN CONCERN
Sebum imbalance



SYN®-AKE

The all-in-one medical beauty solution

Highly potent patented biomimetic tripeptide:

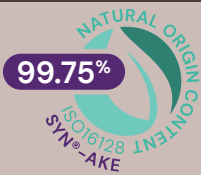
1. Helps skin to look relaxed, visibly reducing and preventing mimic wrinkles (botox-inspired efficacy)
2. Re-densifies skin from within, smoothening deep wrinkles (filler-inspired efficacy)
3. Mattifies skin and improves texture

For healthy-looking skin and confidence boost!



SYN®-AKE

ID Card

INCI NAME:	Dipeptide Diaminobutyroyl Benzylamide Diacetate, Glycerin, Aqua				
TECHNOLOGY:	- Inspired by the power of nature - Highly potent biomimetic tripeptide, made by cutting-edge SYN®-Peptide technology to mimic the essential amino acid sequence of Waglerin-1, a natural occurring polypeptide with a strong ability to relax muscle contraction		- In silico model shows that SYN®-AKE peptide is able to fit into the catalytic binding site of DPP4 (Dipeptidylpeptidase 4) - TFA-free¹ 99.75% of natural origin (according to ISO 16128)		
TECHNICAL:	Form: Liquid pH of use: 3.0–7.5	Use level: 1–4% Preservative: Free	Solubility: Miscible in water		
BENEFITS:	- Reduces muscle cell contractions: immediately, long-lasting and fully reversibly* - Up to 47% inhibition of muscle nicotinic acetylcholine receptor (maAChR)* - Stimulates PLOD3² activity, important for the stability of intermolecular collagen crosslinks*		- Controls DPP4, a potential target linked to sebaceous gland activity* - Helps skin to relax without losing the ability to express** - Visibly reduce lines and wrinkles on three different skin tones** - Wrinkles reduction across age groups** - Can delay wrinkles’ appearance up to 5 years** - Mattifies skin and improves texture **		
REGISTRATION CERTIFICATION:	      				

1. Non-intentionally added TFA; 2. procollagen-lysine, 2-oxoglutarate 5-dioxygenase 3
* in vitro ** in vivo

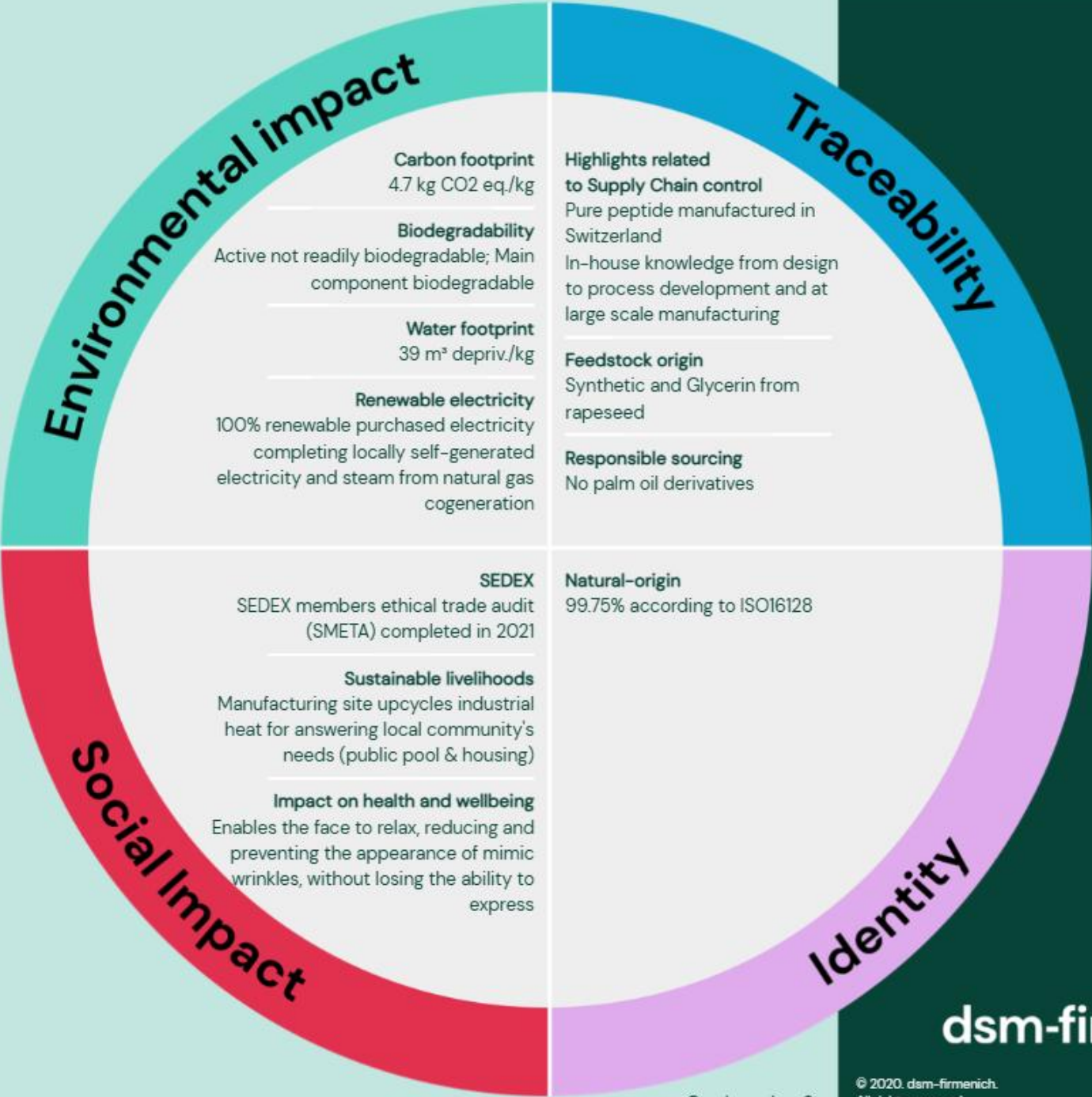
SYN®-AKE

INCI name: Dipeptide Diaminobutyroyl Benzylamide Diacetate,
Glycerin, Aqua
Product codes: 5038444

PIONEER IN PEPTIDES

High performance active with low carbon footprint contribution

Natural inspired mechanism



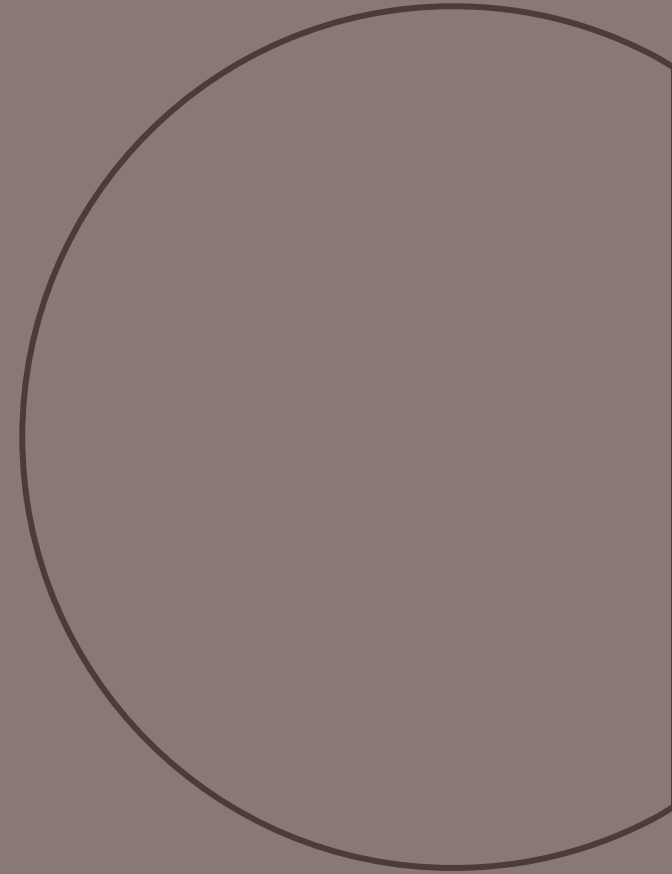
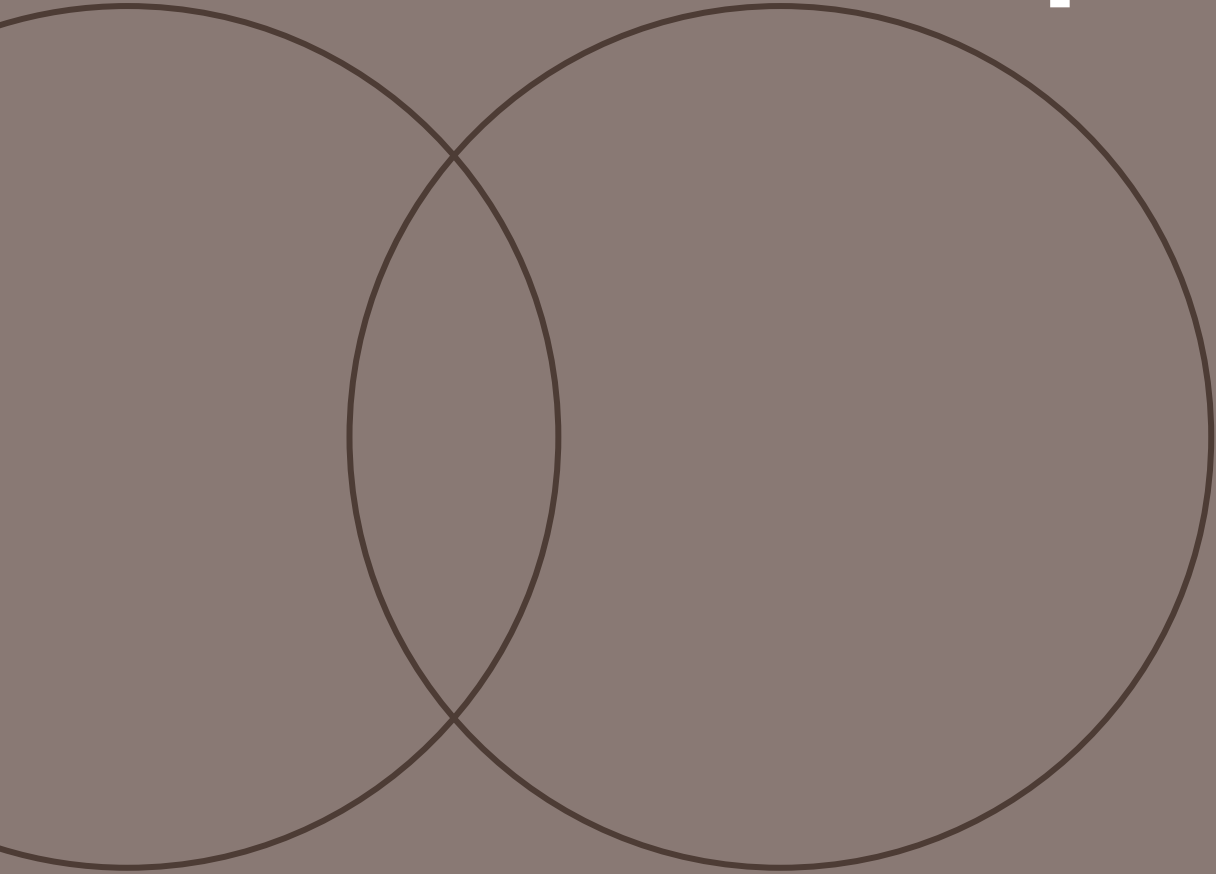
Aligned with and contributing to the

SUSTAINABLE DEVELOPMENT GOALS



The carbon and water footprint calculations are based on internally conducted LCA according to ISO 14040/44 guidelines, dsm-firmenich LCA policy and validated by an internal reviewer. The biodegradability is based on relevant OECD tests.

03 Mode of action & in vitro proof



Inspired by the power of nature

Scientific mode of action

Found in Temple Viper Venom, Waglerin-1 is naturally occurring polypeptide with a strong ability to relax muscle contraction

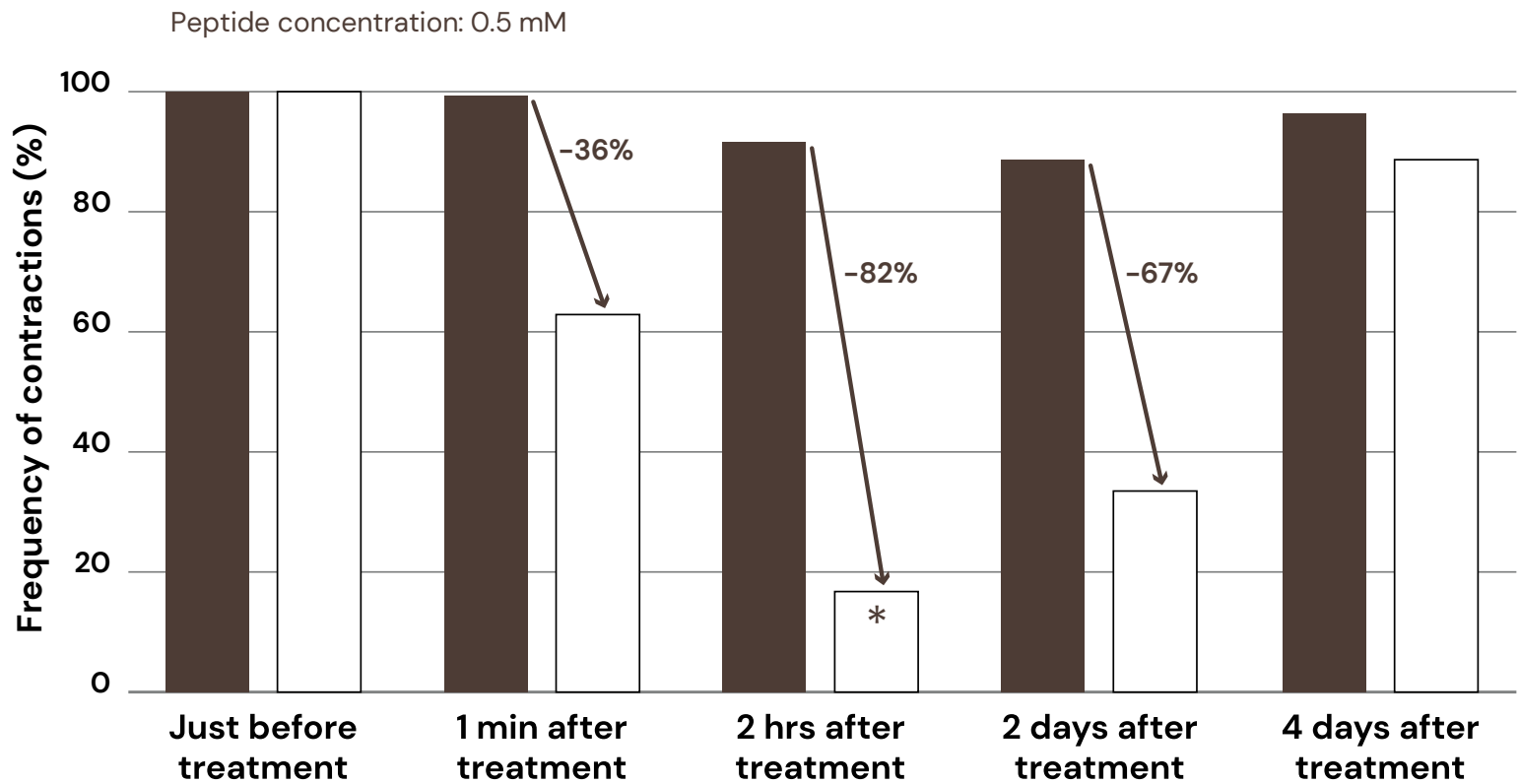
SYN®-AKE is a biomimetic tripeptide, with unique amino acid sequence (Beta-Ala-Pro-Dab-NH-Bzl) mimicking Waglerin-1 functionality, for Botox-like efficacy

Scientific evidences not intended to be final product claim.

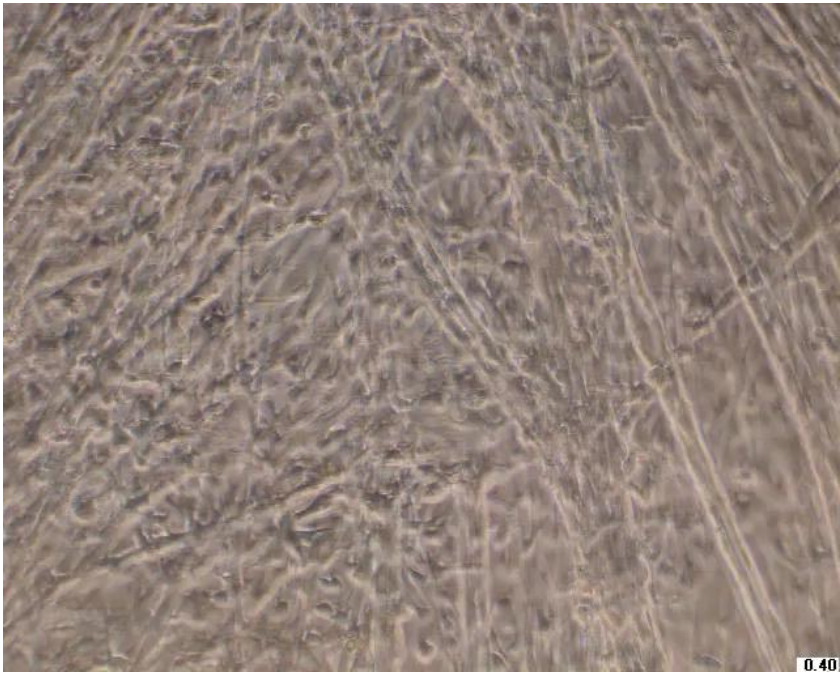
SYN®-AKE helps skin to look relaxed

In vitro

Proven in vitro to reduce muscle cell contractions: immediately, long-lasting and fully reversibly



In vitro muscle cell culture, the frequency of the muscle cell contractions



SYN®-AKE (0.5 mM) visibly reduces muscle cell contractions after 1 min

*p<0.05
Cell contraction action is related to scientific evidences (in vitro) and is not intended to be final product claim

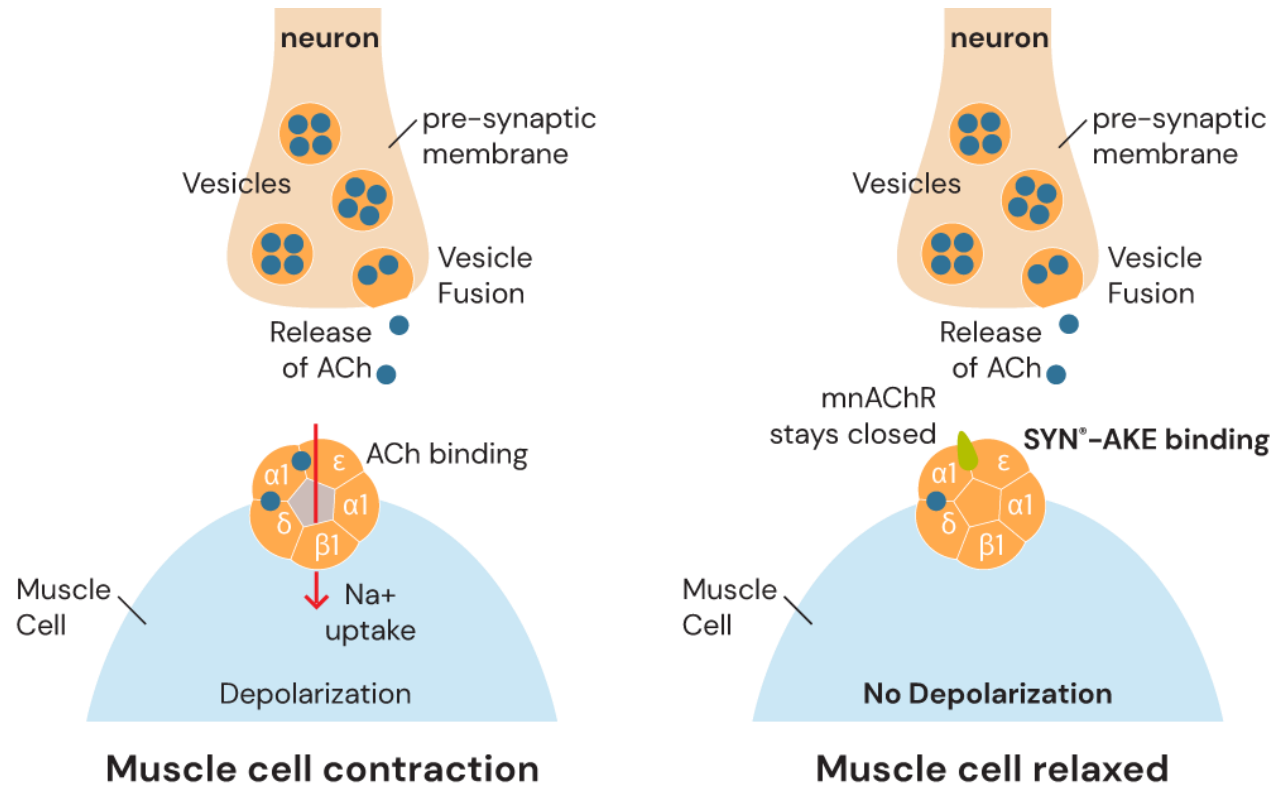
SYN[®]-AKE mode of action

In vitro

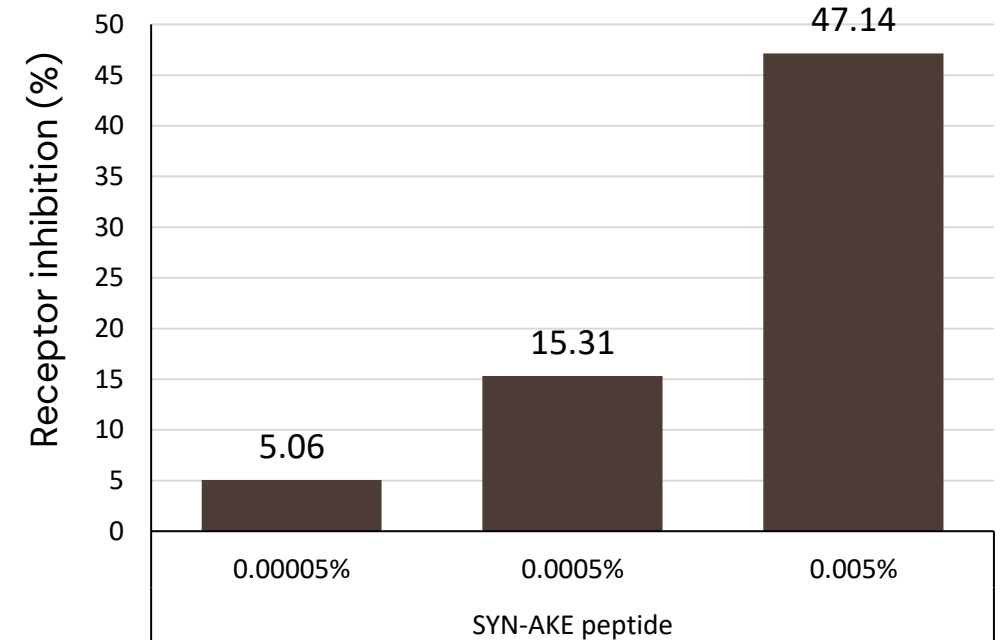
A muscle nicotinic acetylcholine receptor (maAChR)

SYN[®]-AKE peptide binds to Acetylcholine receptor and inhibits the uptake of Acetylcholine leading to muscle relaxation.

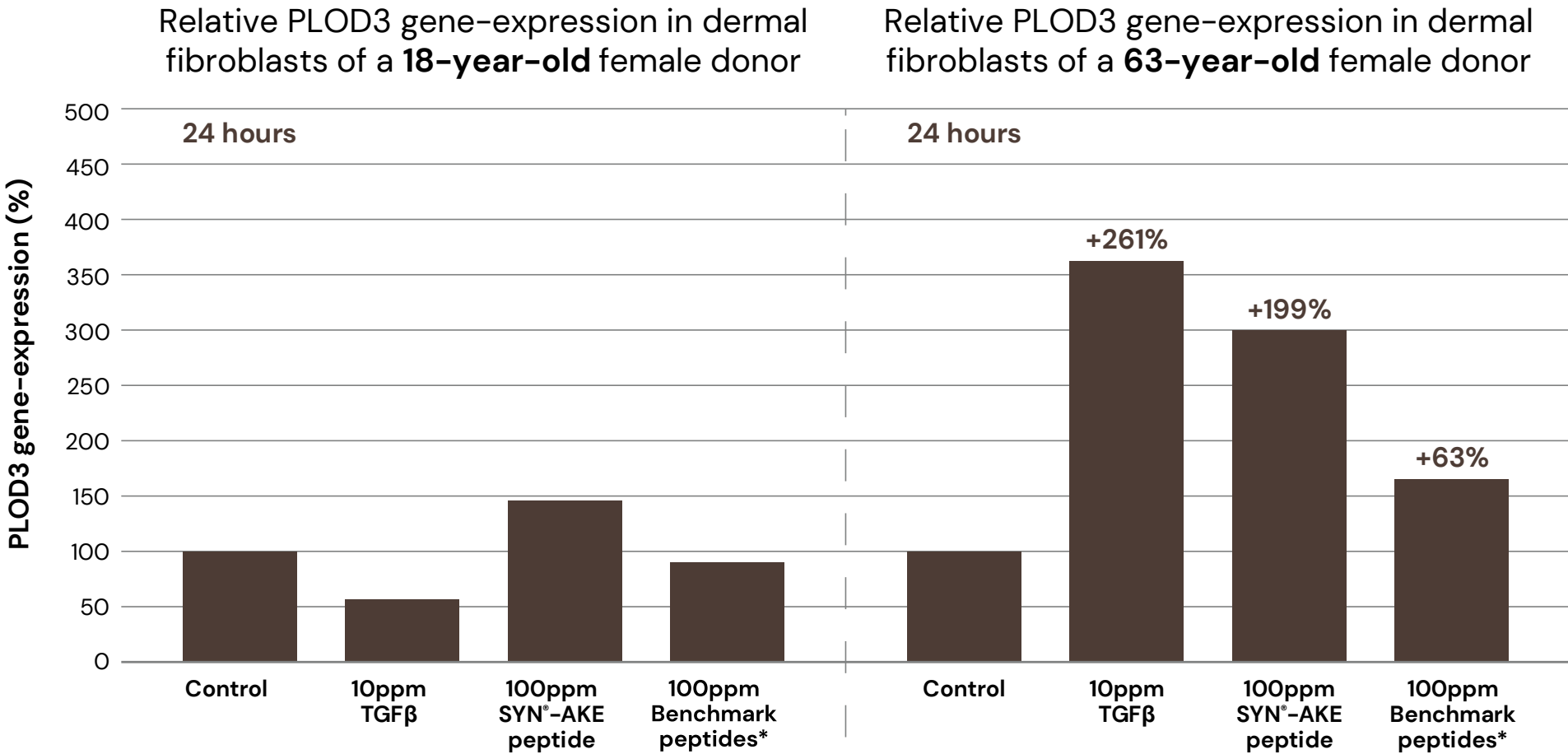
Up to 47% inhibition of Nicotinic Acetylcholine receptor



Nicotinic acetylcholine receptor inhibition test on HEK 293 cells



It helps skin to auto-repair and look replenished, outperforming competition



Tests performed on human dermal fibroblasts young (18) and old donor (63), in partnership with GLP external Institute Measured by rt-PCR on a LightCycler Device (Roche Molecular Diagnostics Inc). Experiment was done in duplicates.
* Palmitoyl Oligopeptide and Palmitoyl Tetrapeptide-7

Dermal & DEJ
Collagen fibres quality
+387%
positive PLOD3
induction in vitro
PLOD3 key biological entity
to assemble Collagen

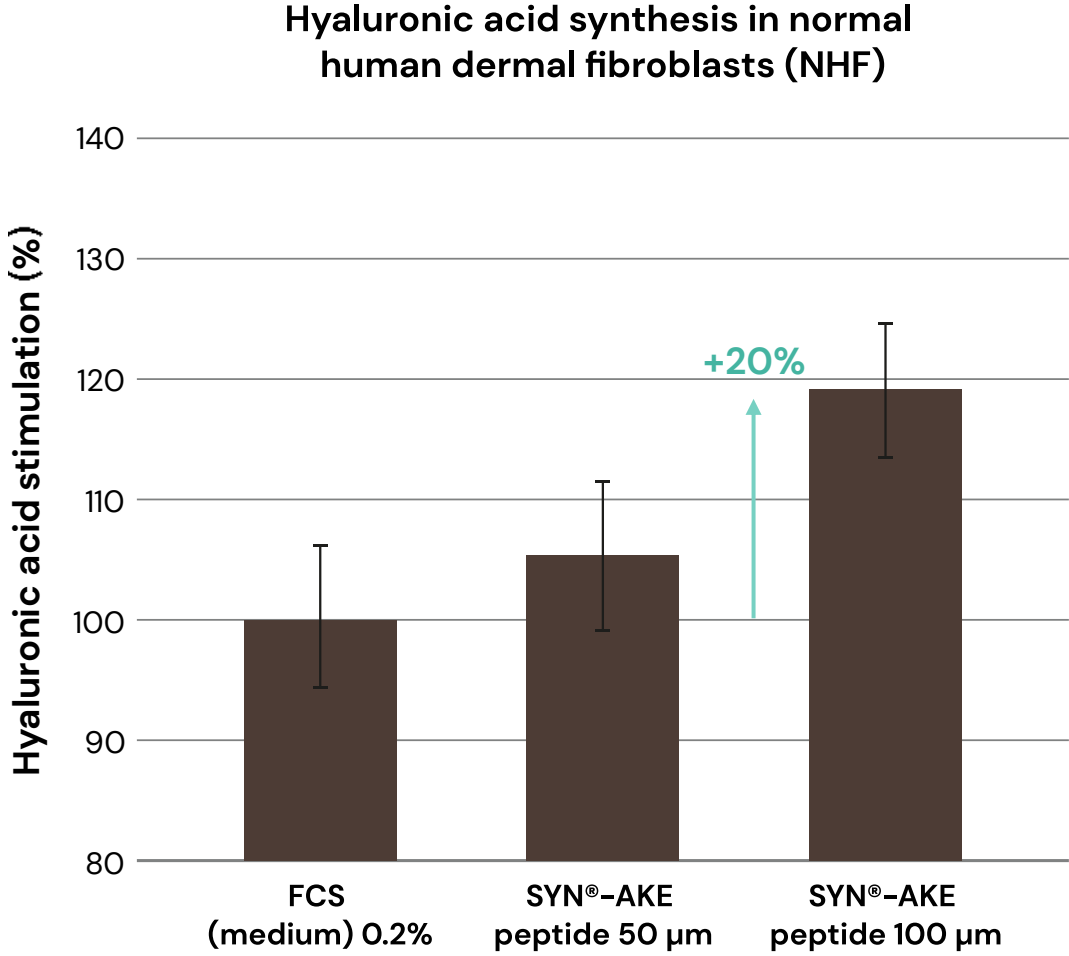
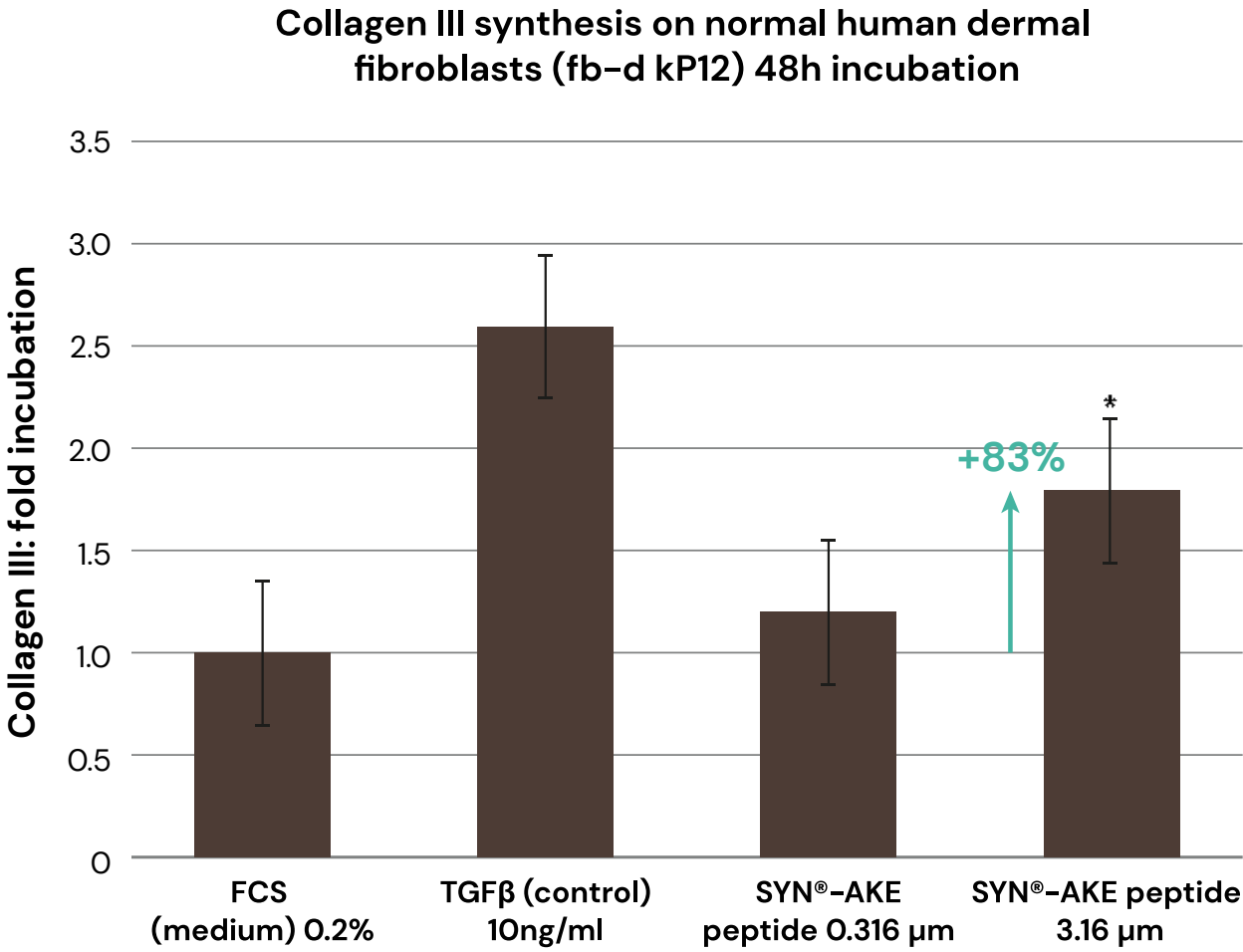


Patent publication discloses to the use of SYN®-AKE peptide for revitalizing, strengthening and increasing the integrity of collagen fibres, increasing skin elasticity and resiliency, improving skin moisturization and skin firmness and reducing skin pore size.

SYN®-AKE re-plumps skin from within

It stimulates Collagen III and Hyaluronic acid synthesis

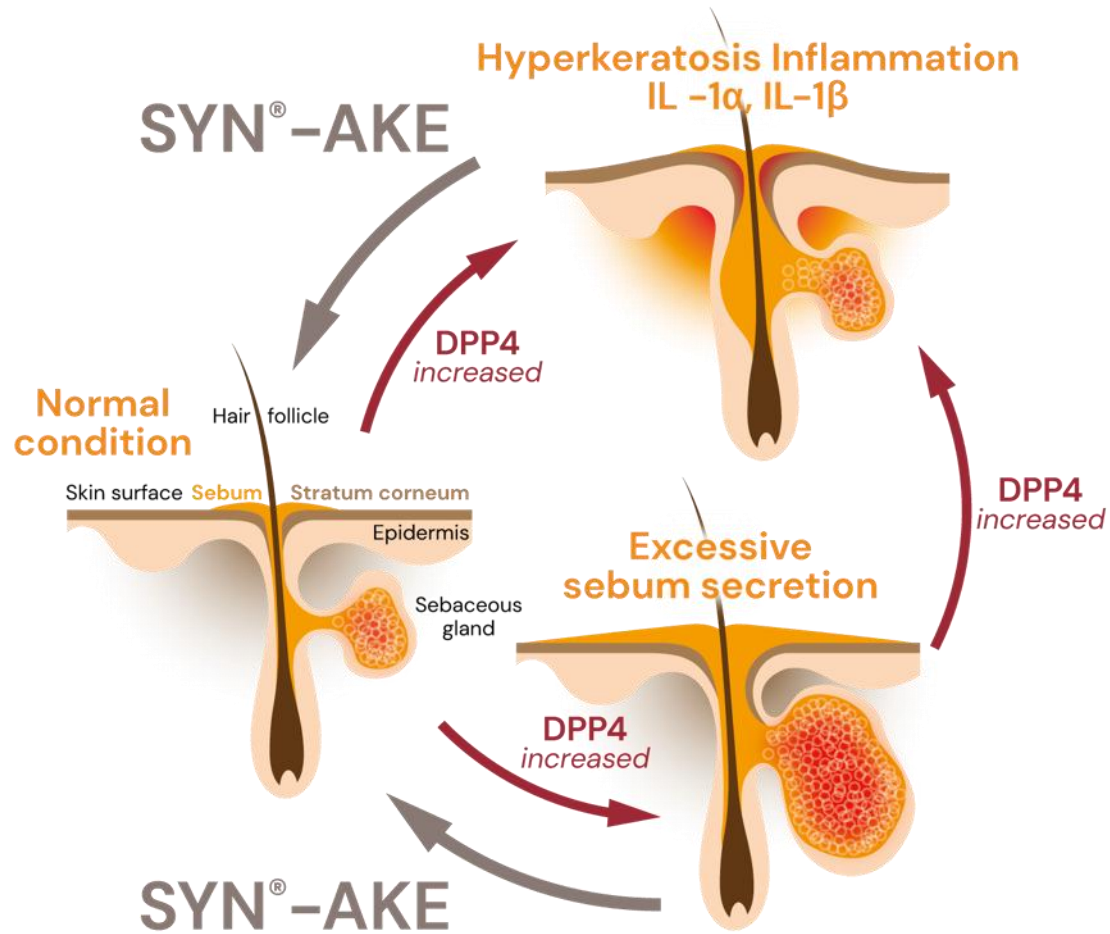
In vitro



*p<0.05 vs FCS 0.2%

SYN®-AKE inhibits DPP4 activity

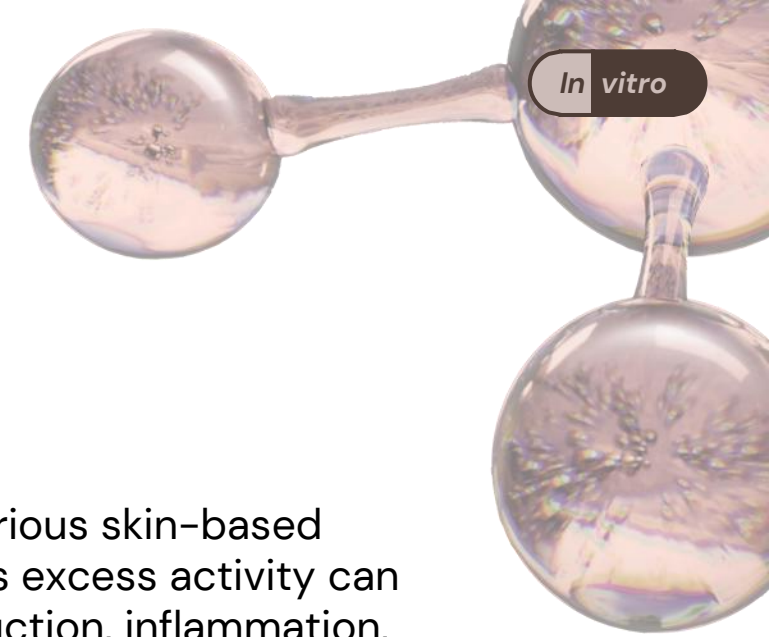
DPP4 (dipeptidylpeptidase 4) identified as a novel potential target linked to sebaceous gland activity and skin inflammation



DPP4 is a key enzyme in various skin-based biological processes and its excess activity can result in sebum over-production, inflammation, keratinocyte hyper-proliferation and delayed wound healing.

Visible effects of DPP4 overactivity include greasy, shiny skin, irritation, redness, pimples and small lesions in skin.

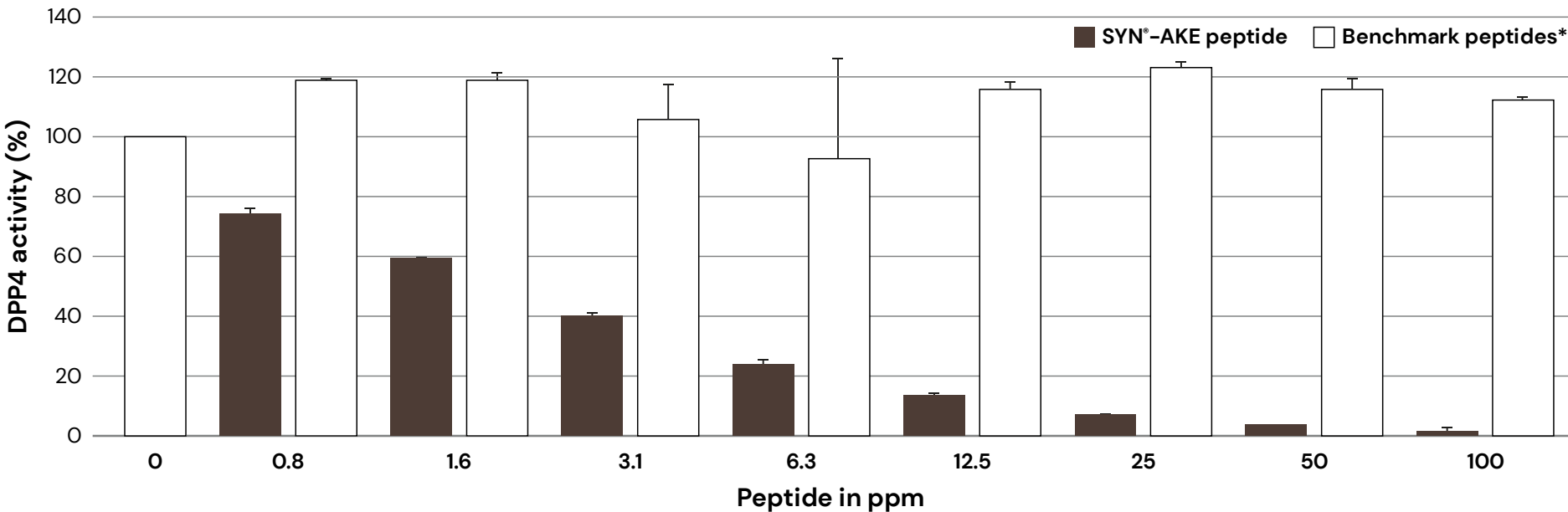
These skin imperfections are further impaired by pollution and accelerate the aging process.



SYN®-AKE inhibits DPP4 activity

In vitro

- Experimental data from DPP4 activity assay kit with comparison of SYN®-AKE peptide to the anti-aging peptides. Dose dependent inhibition is observed with SYN®-AKE peptide whereas the anti-aging peptides were ineffective.
- Tests performed *in tubo* DPP4 assay kit.



DPP4 Control
High specific
activity

Novel potential
target linked to
sebaceous activity



Patent publication discloses the use of SYN®-AKE peptide as DPP4 inhibitor for treatment of disorders of sebaceous glands such as acne, sebaceous hyperplasia, seborrheic/atopic dermatitis and rosacea.

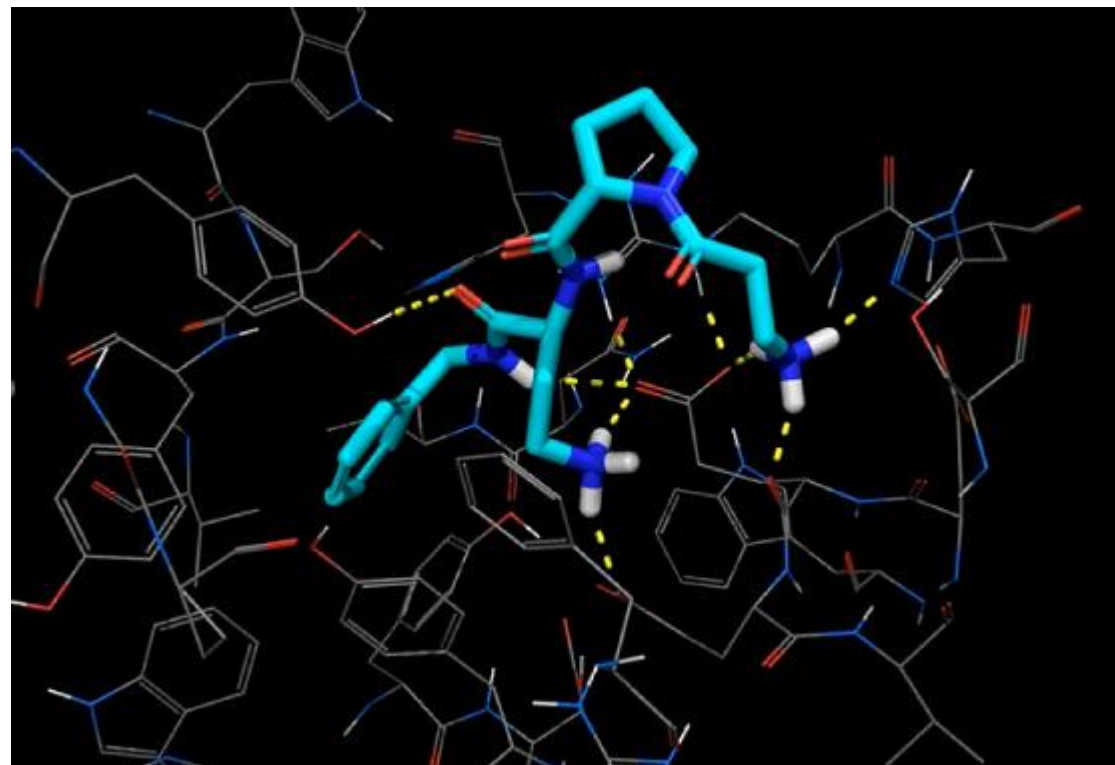
* Palmitoyl Oligopeptide and Palmitoyl Tetrapeptide-7
**p<0.01 vs benchmark peptide

Computational chemistry

Understanding the activity at a molecular level

In silico docking results

In silico docking of SYN®-AKE to the DPP4 protein structure used to predict potential mode of binding (see figure)



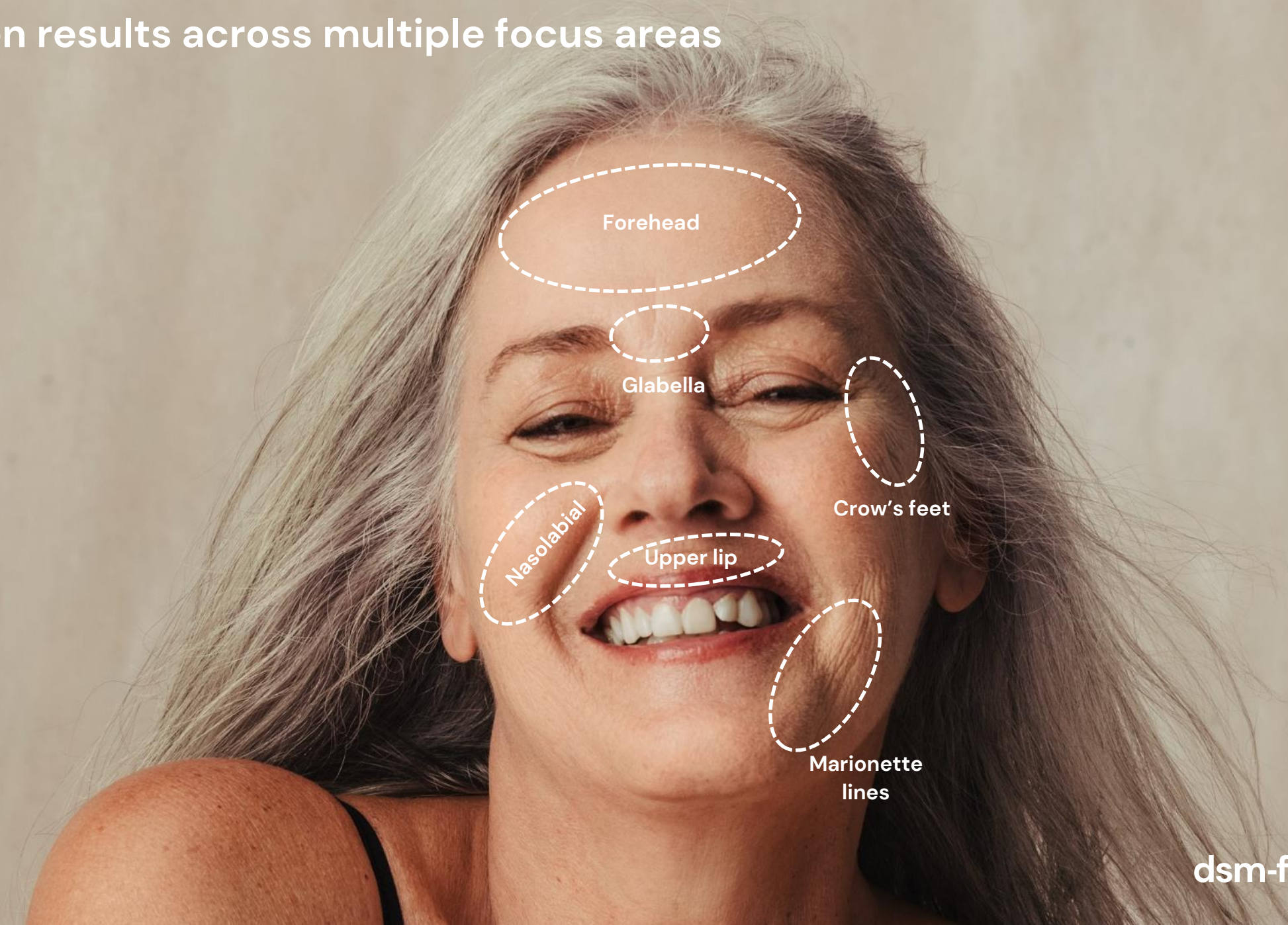
The proposed binding mode of SYN®-AKE shows the DAB positively charge NH_3^+ moiety forming a tight hydrogen bond network around the Glu205 and Glu206 residues and the Benzyl residue occupies the S1 pocket, similarly to other DPP4 inhibitors. The S2 pocket is occupied by the Proline-Beta-Alanine moiety of SYN®-AKE. The Proline group sits above Phe357 forming hydrophobic interactions with this residue. The terminal Beta Alanine extends deep into the S2 pocket forming two favorable H-bond interactions with Arg669 and Ser209.

04 In vivo validation



Proven results across multiple focus areas

In vivo



3 major previous Clinical Studies

Collecting compelling substantiation



Clinical study #1
4-week study

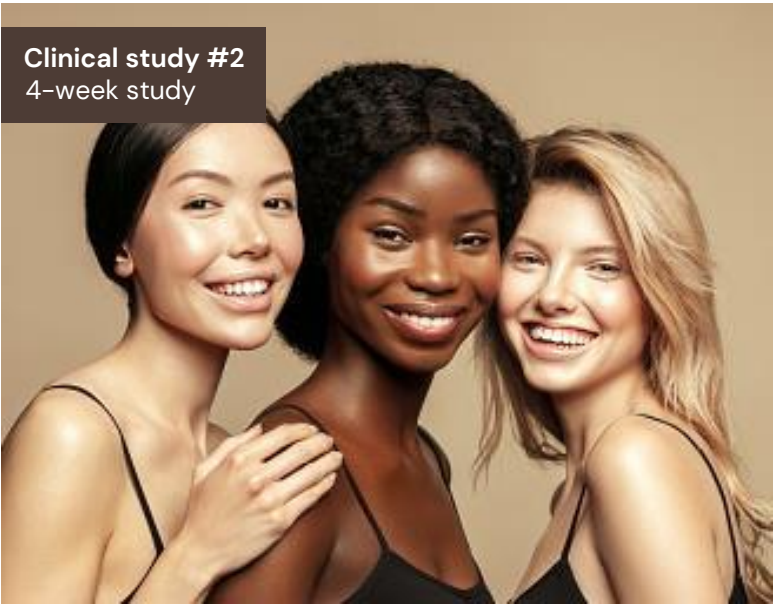
Target group:
Females 41-60 y.o.

Application:
2x per day, full face

15 volunteers per group:

- Placebo
- SYN®-AKE (4%)

Double-blind study



Clinical study #2
4-week study

Target group:

- Females 41-64 y.o.
- 3 different skin tones

Application:
2x per day, full face

50 volunteers per skin tone:

- 25 Placebo
- 25 SYN®-AKE (4%)

Double-blind study



Clinical study #3
4-week study

Two target groups:

- 50-65 y.o. ('Mothers')
- 21-35 y.o. ('Daughters')

Application:
2x per day, full face

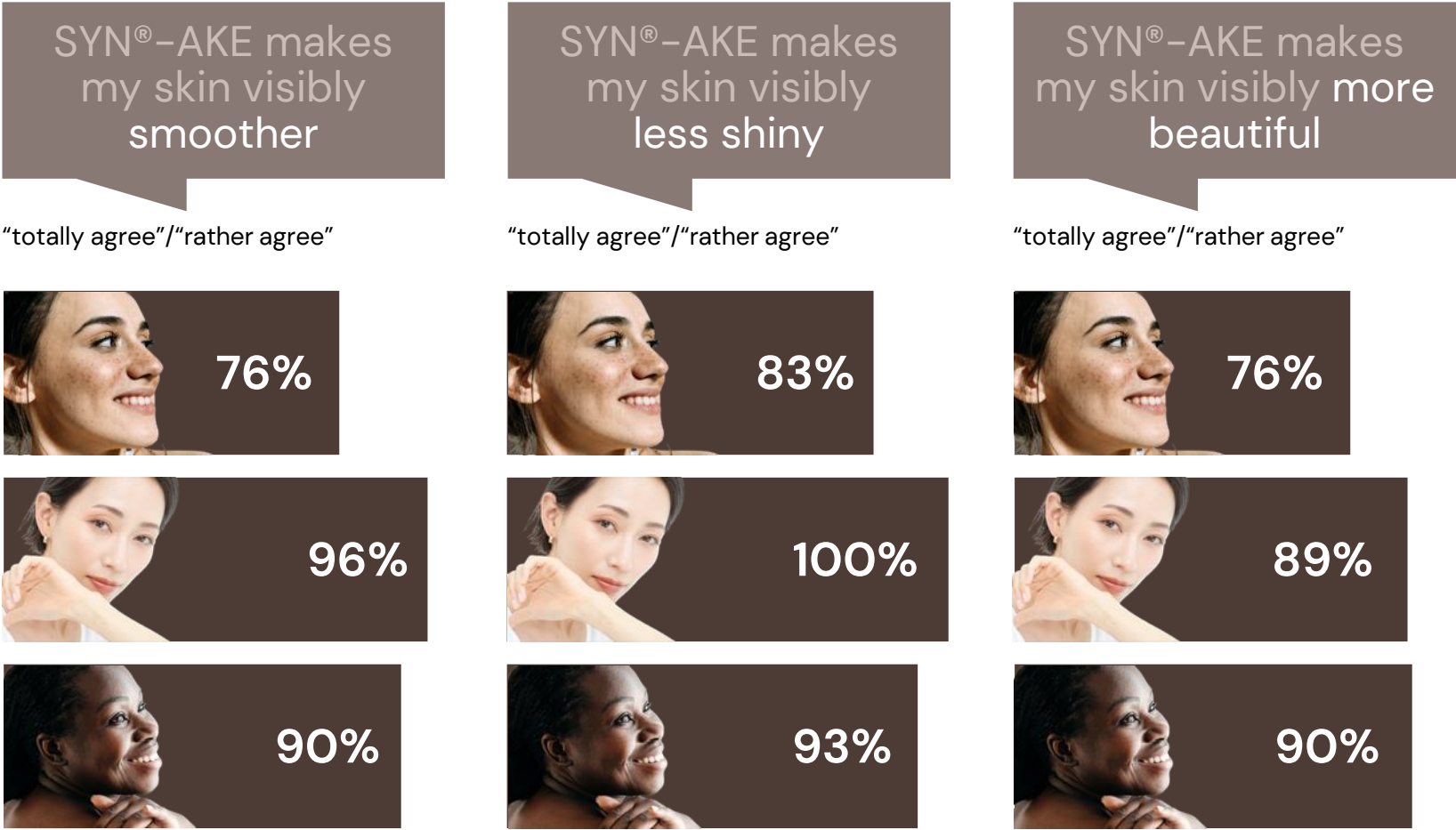
25 volunteers per group:

- Placebo
- SYN®-AKE (4%)

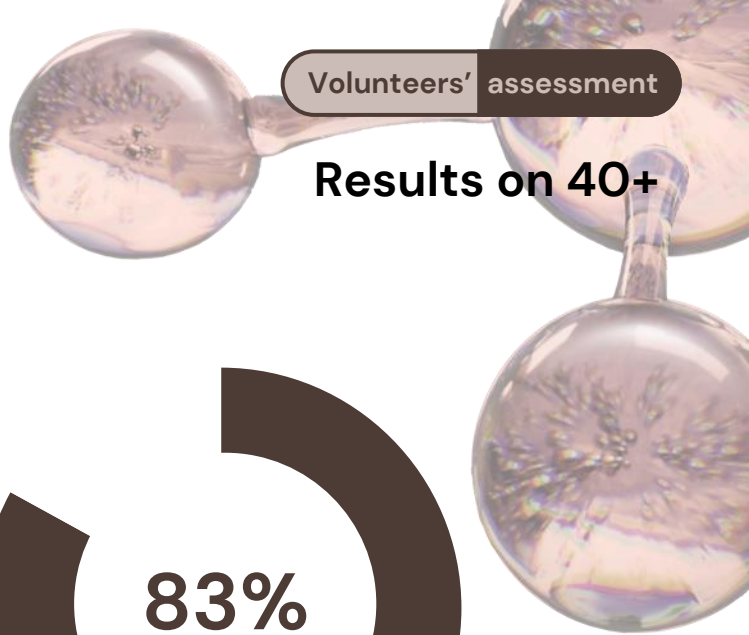
Double-blind study

SYN®-AKE Satisfaction Test

Consistent beauty improvements for all women



Clinical study No. 2: Results on 41-64 y.o. group

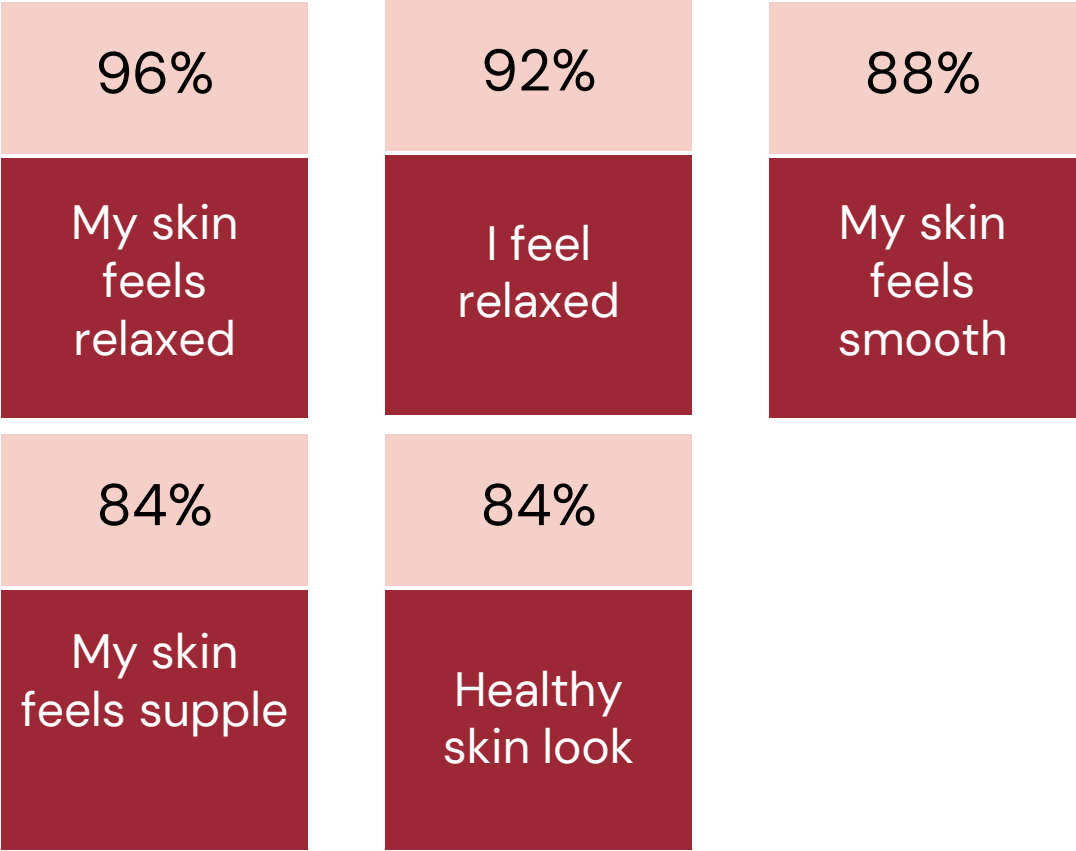


of women feel
**more
confident**

Skin feel & perceptions

Volunteers' self-assessment

“After the application...”



Study

Results on 20–35 y.o.



In vivo efficacy on mimic wrinkles

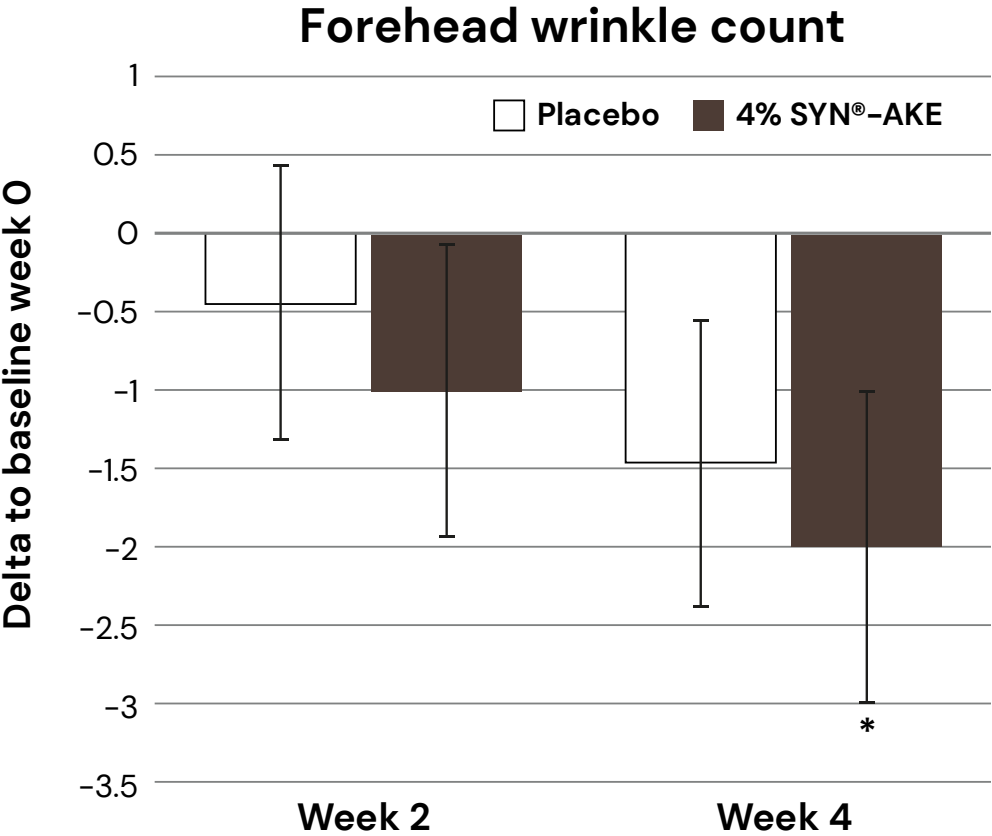
40+ y.o.



“Worry-less” forehead with SYN®-AKE

-1 wrinkle in 2 weeks, -2 wrinkles in 4 weeks

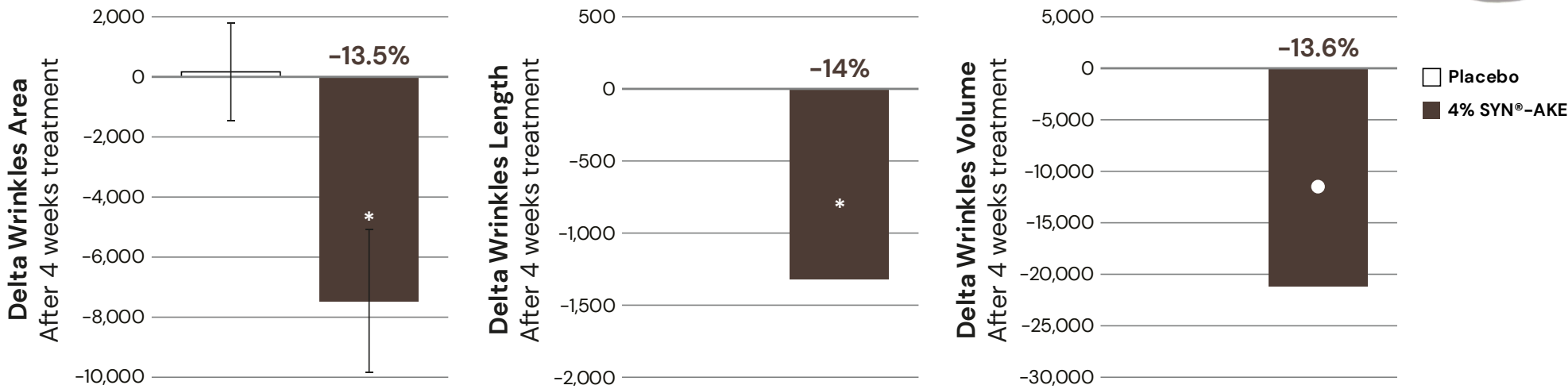
Volunteer #139, age 62



Clinical study No. 2: Wrinkle analysis with Primos^{lite} after 2 and 4 weeks of treatment with 4% SYN®-AKE
* P<0.1 vs baseline

SYN®-AKE helps skin to look relaxed

Without losing the ability to express



Computer-based wrinkle segmentation shows a decrease in wrinkle formation after 4 weeks application of the 4% SYN®-AKE formulation on the glabella. Images show a representative volunteer.

Clinical study No. 3: Results on 41-64 y.o. group – Graphs: Mean delta for all volunteers is shown
 * p<0.05 vs placebo ○ p=0.076 vs placebo

SYN®-AKE smoothens crow's feet

Outstanding length reduction, cumulatively close to ½ cm

Volunteer #8, age 59

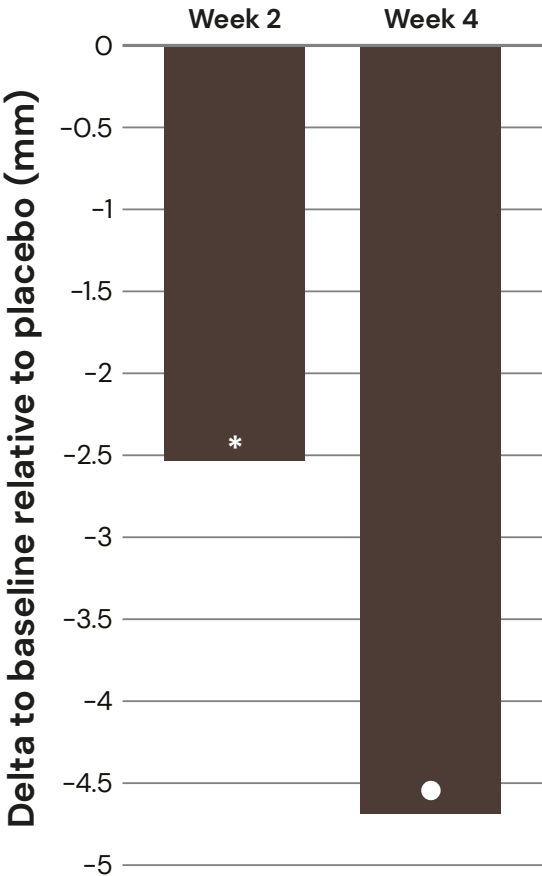


Baseline

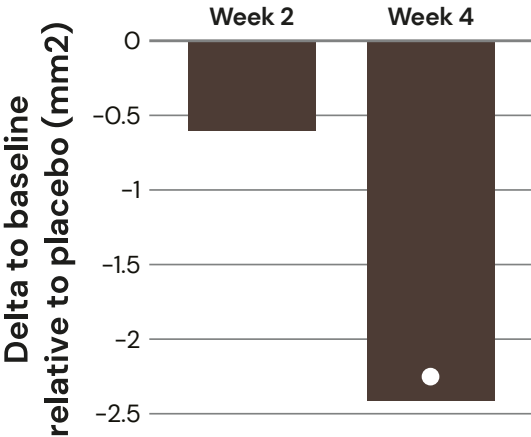


Week 4

Crow's feet length



Crow's feet area



Volunteer #52, age 50



Baseline

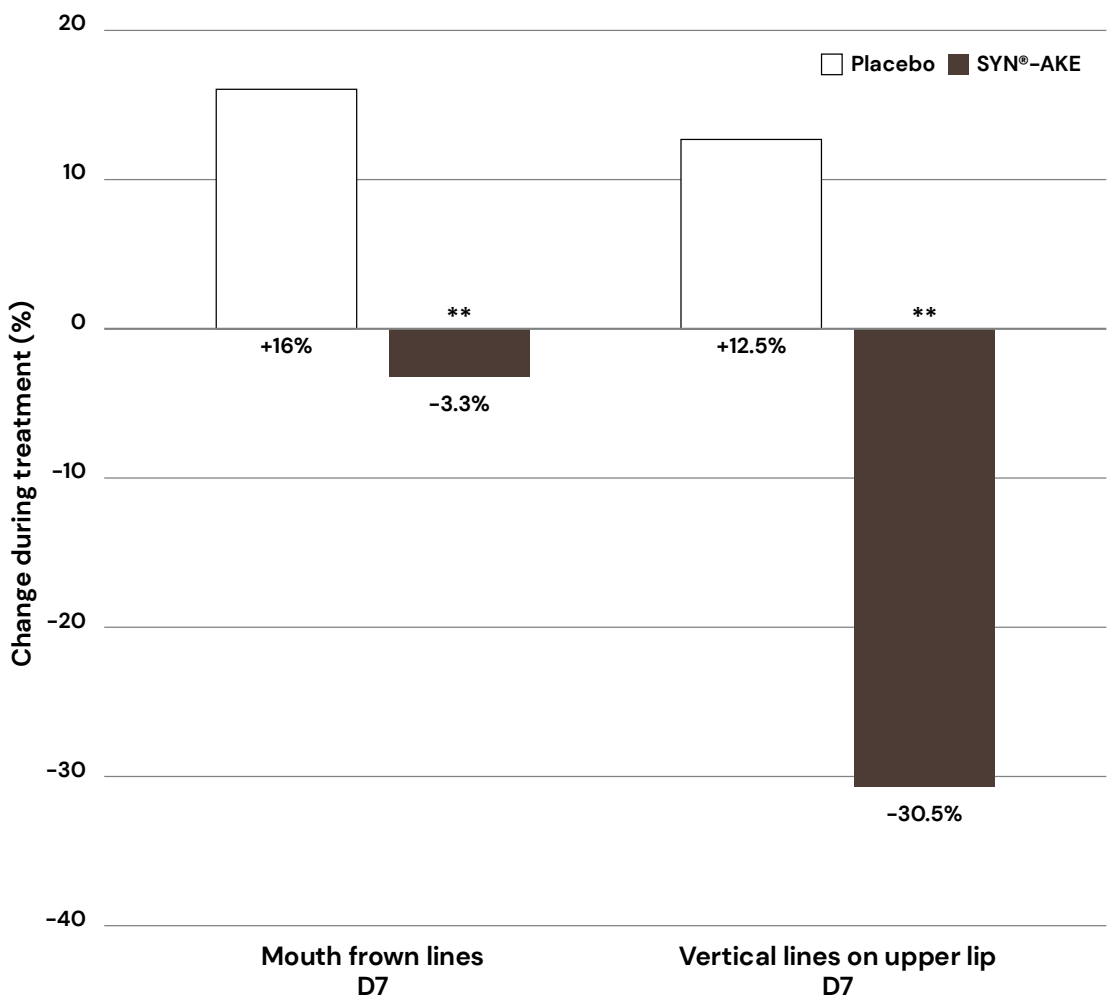
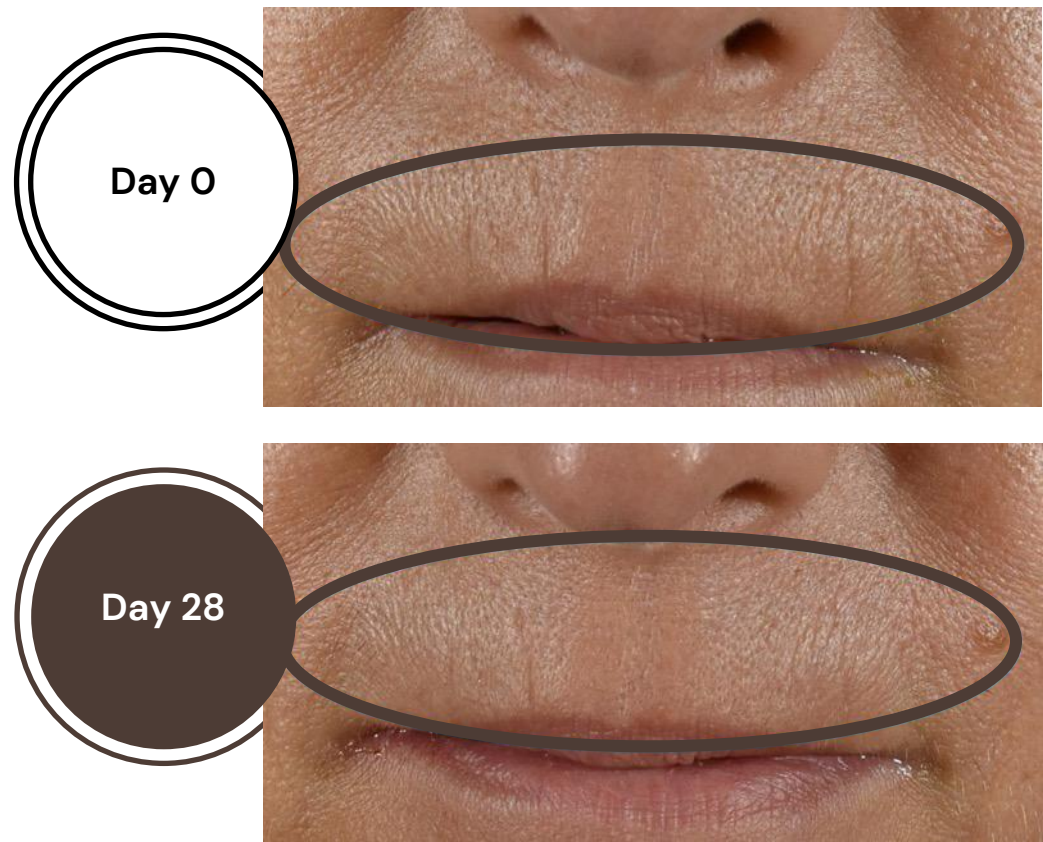


Week 4

Clinical study No. 3: Results on 41-64 y.o. group. Wrinkle analysis with Primos^{lite} after 2 and 4 weeks of treatment with 4% SYN®-AKE

* p<0.05 vs baseline ○ p<0.1 vs baseline

Significantly reduces the appearance of upper-lip vertical lines

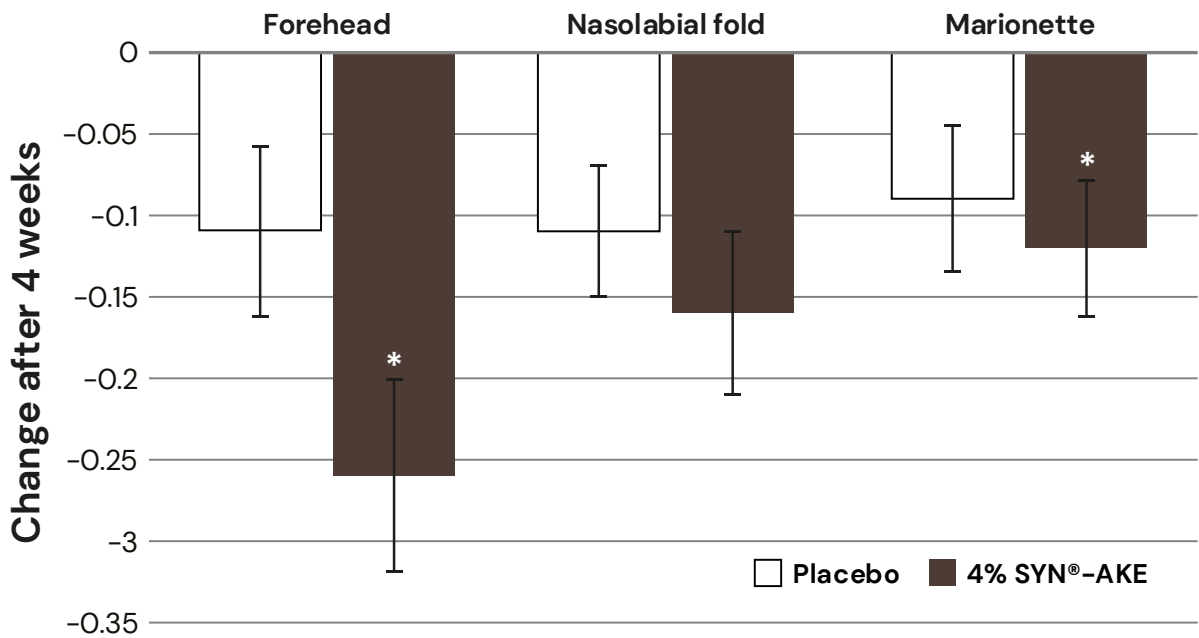


Volunteers had to apply their respective product on full face twice daily in the morning and in the evening. The **graph** shows clinical study mean values in percent.

Clinical study No. 2: Test on 3 different skin tones In the picture, volunteer n.29
* p<0.05 compared to Placebo

Skin expert diagnoses visible improvement with SYN®-AKE

Expert grading

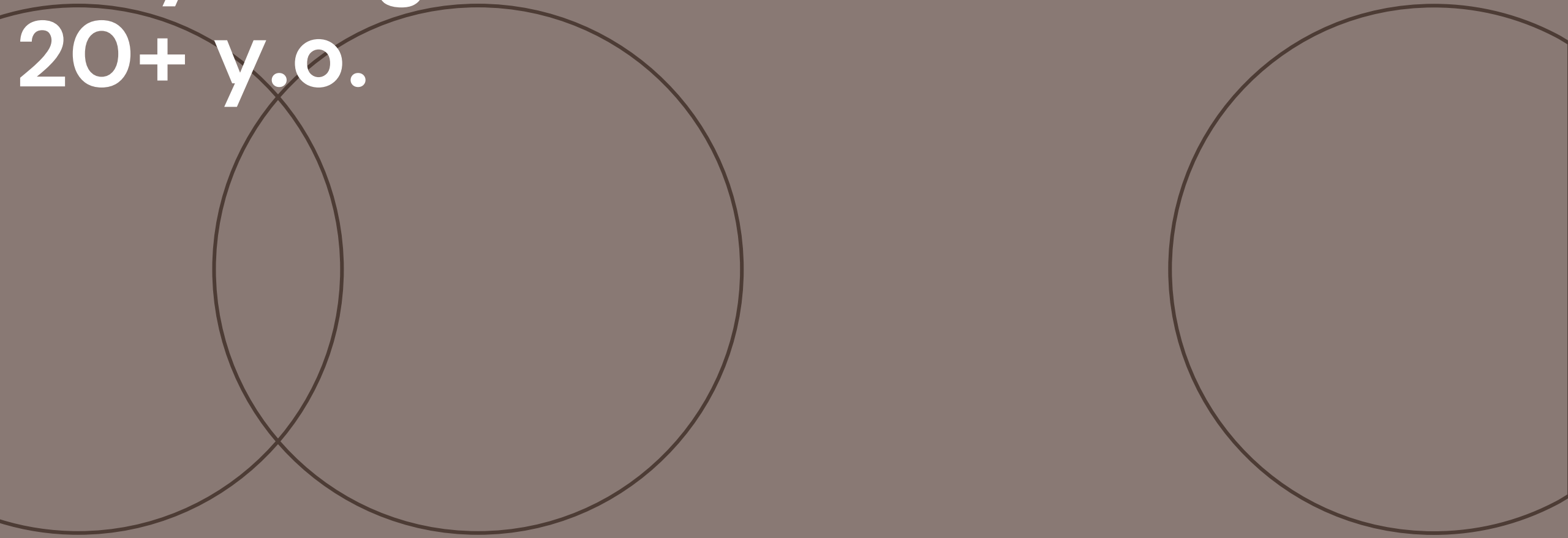


Clinical study No. 3: Results on 41-64 y.o. group – Expert grading results on the forehead, the nasolabial folds and the marionette lines (smiling lines in the corner of the mouth).

*p<0.05 vs baseline

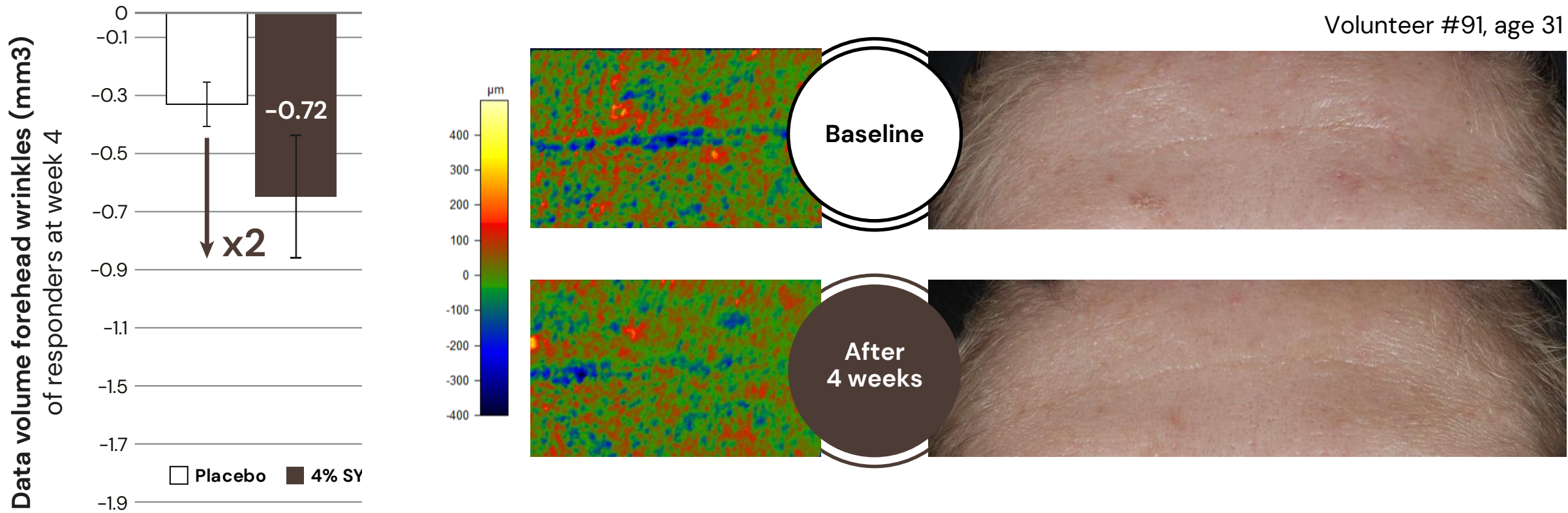


Mimic-wrinkles prevention on younger volunteers 20+ y.o.

A decorative graphic consisting of three large, thin-lined circles. Two circles overlap on the left side, and a third circle is positioned to the right, partially overlapping the right edge of the frame.

With SYN®-AKE, fine lines smoothing on younger volunteers

2X more effective than placebo on forehead wrinkles for 21-35 y.o.



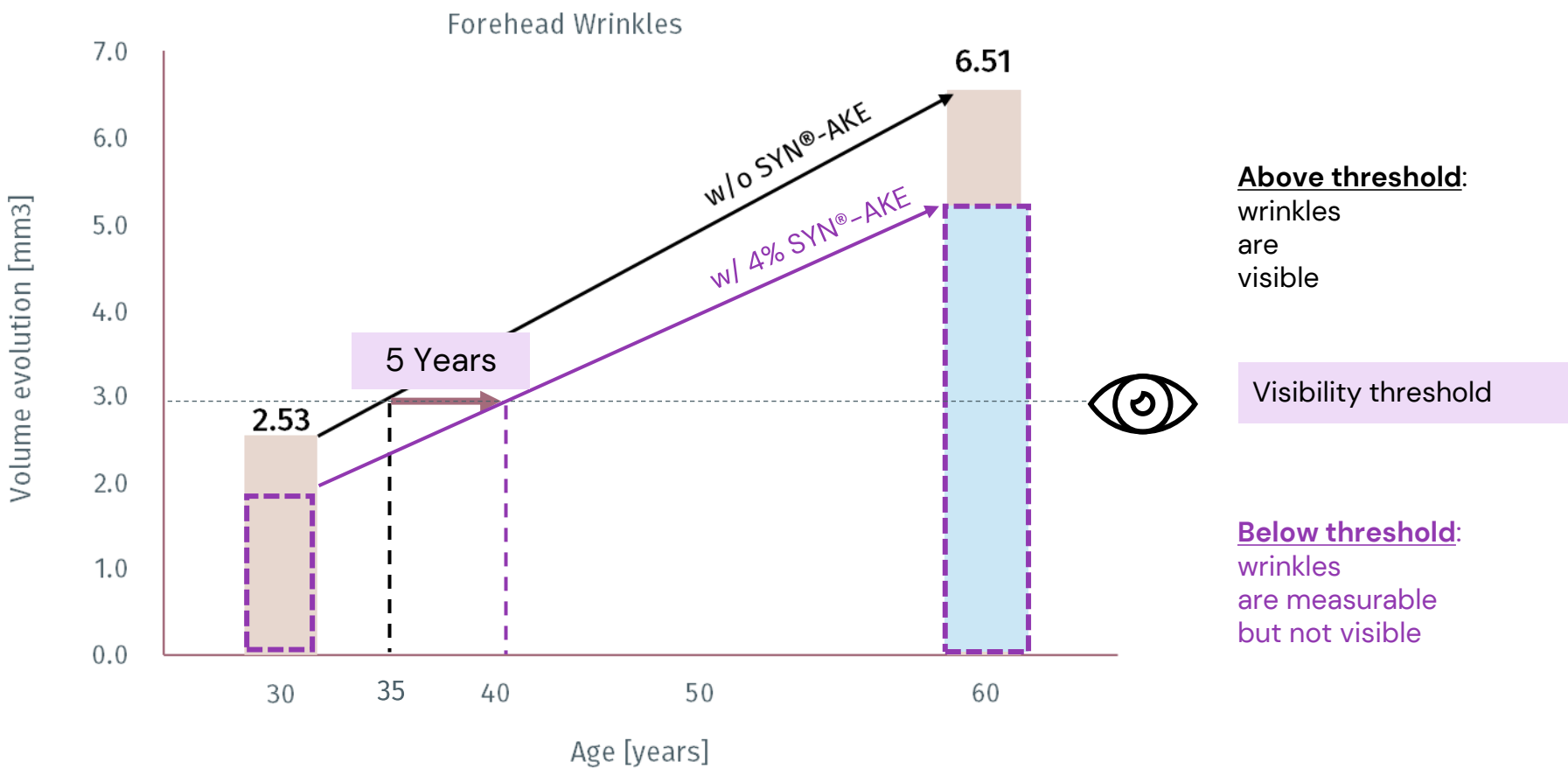
Clinical study No. 3: Results on 21-35 y.o. group – Graphs: Mean delta for all volunteers is shown

Stay younger for longer!

SYN®-AKE can delay wrinkles' appearance up to 5 years, for tangible visible improvements

Quantification of 1 month of product application

Assumption: linear yearly wrinkles' progression (simplification)



Above threshold:
wrinkles
are
visible

Visibility threshold

Below threshold:
wrinkles
are measurable
but not visible

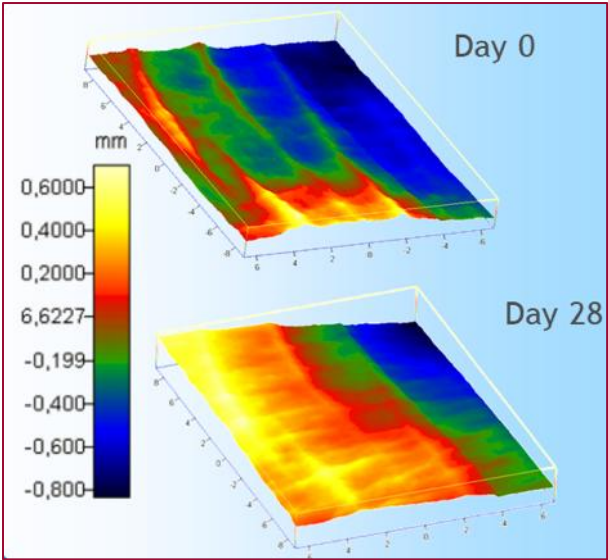
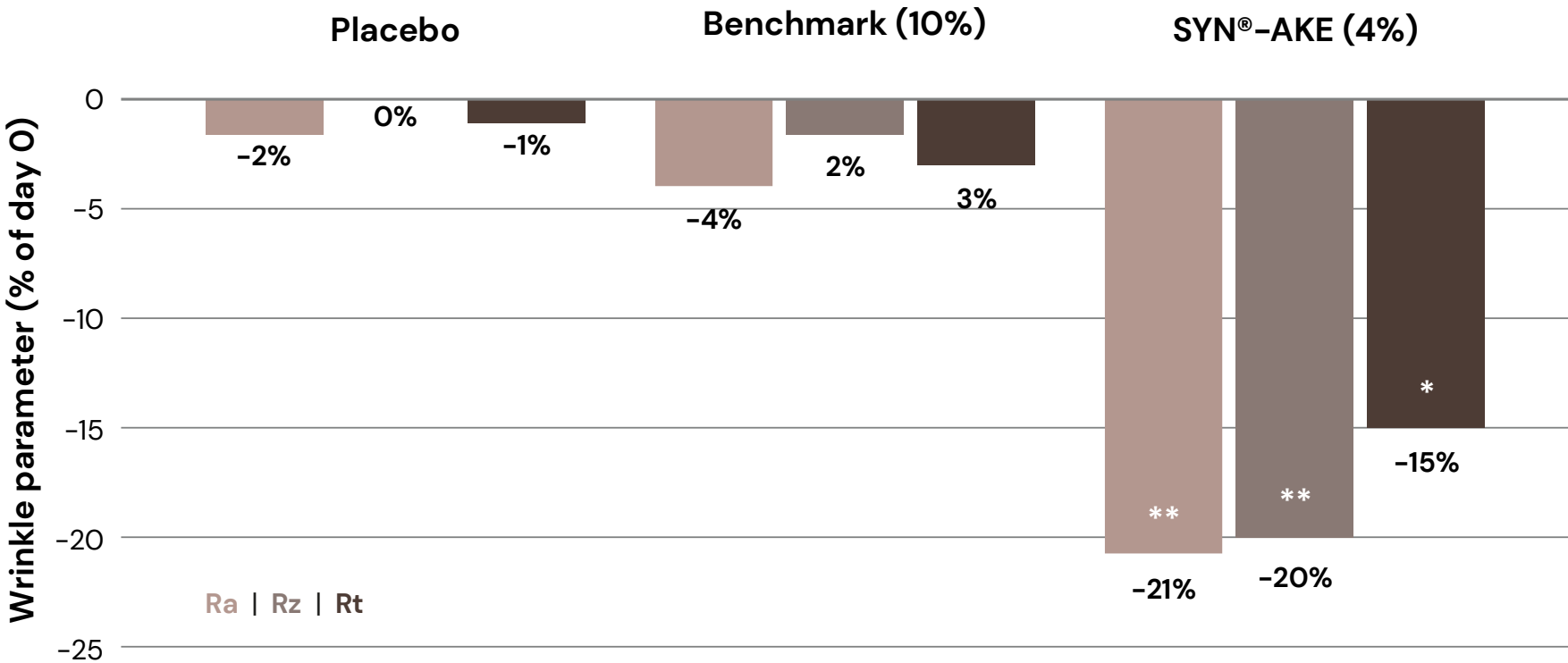
Assumption based on linear extrapolation of dsm-firmenich *in vivo* study results

Efficacy on deep wrinkles 40+ y.o.



SYN®-AKE visibly reduces deep wrinkles in 4 weeks

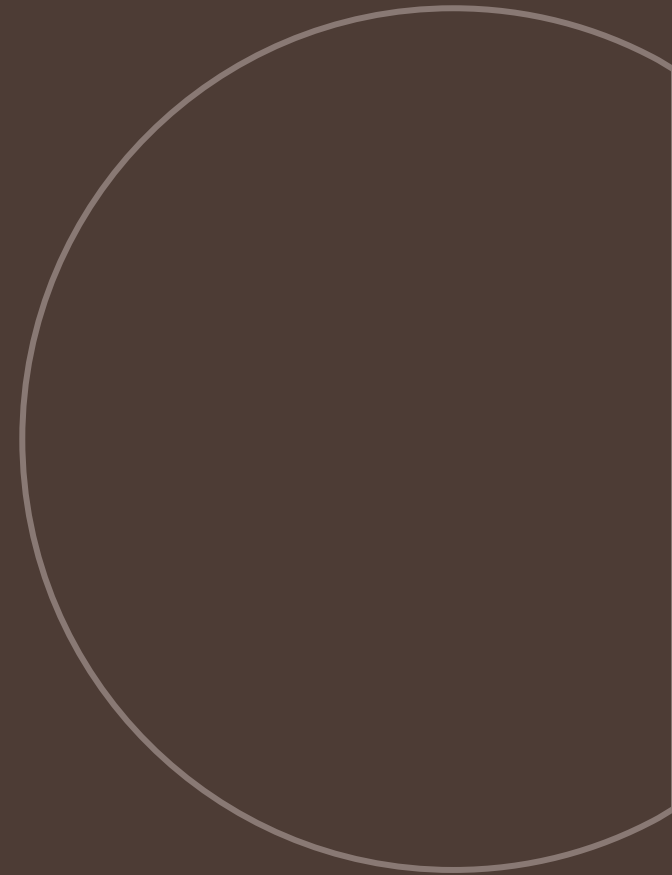
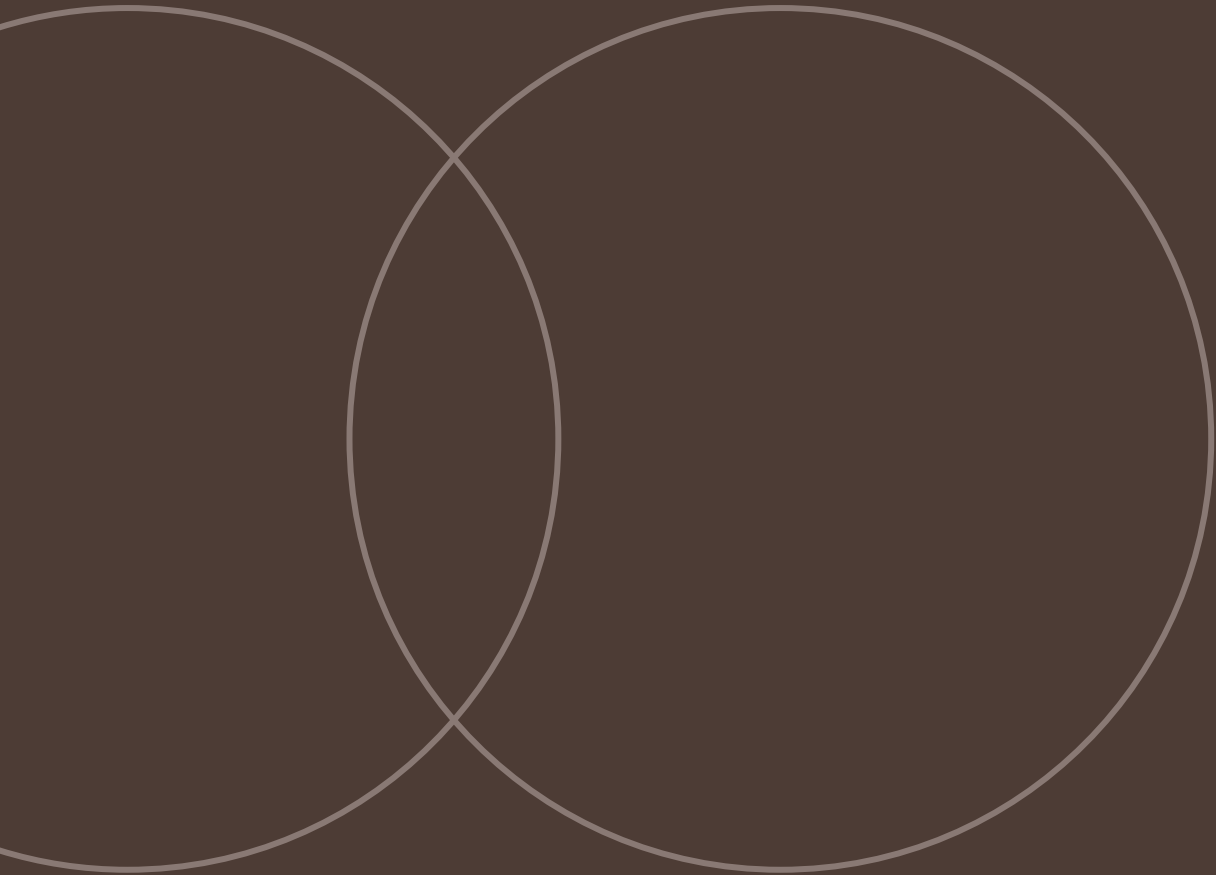
-20% on forehead wrinkles, significantly outperforming competitive hexapeptide



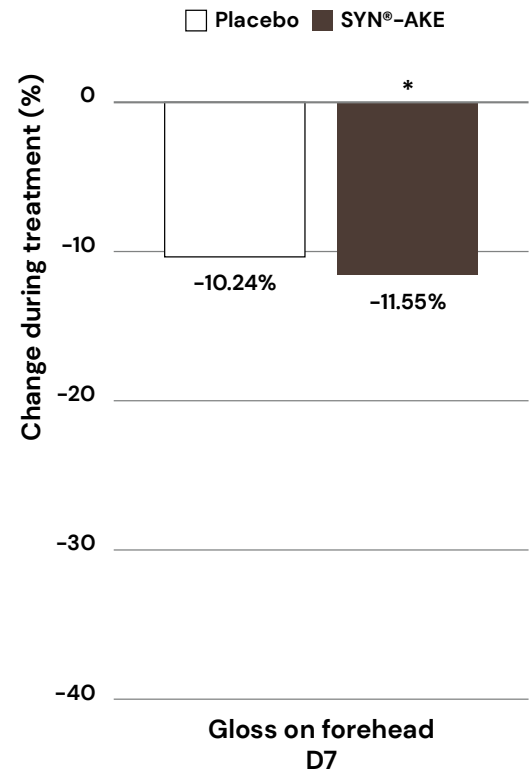
Clinical study No. 1: With Primos 3D®, evaluation of SYN®-AKE (4%) anti-wrinkles effect, measured on the forehead after 28 days application

*p<0.05 **p<0.01

Shine & texture



Shine reduction and flawless looking skin



Patent publication discloses the use of SYN®-AKE peptide for evening out skin tone, brightening of skin, reducing inflammation-related discoloration, erythema and pigmentation of skin and for reducing dark circles under the eye area.

Volunteers had to apply their respective product on full face twice daily in the morning and in the evening. The **graph** shows clinical study mean values in percent.

Clinical study No. 2: Test on 3 different skin tones In the picture, volunteer n.29

* p<0.05 compared to Day 0

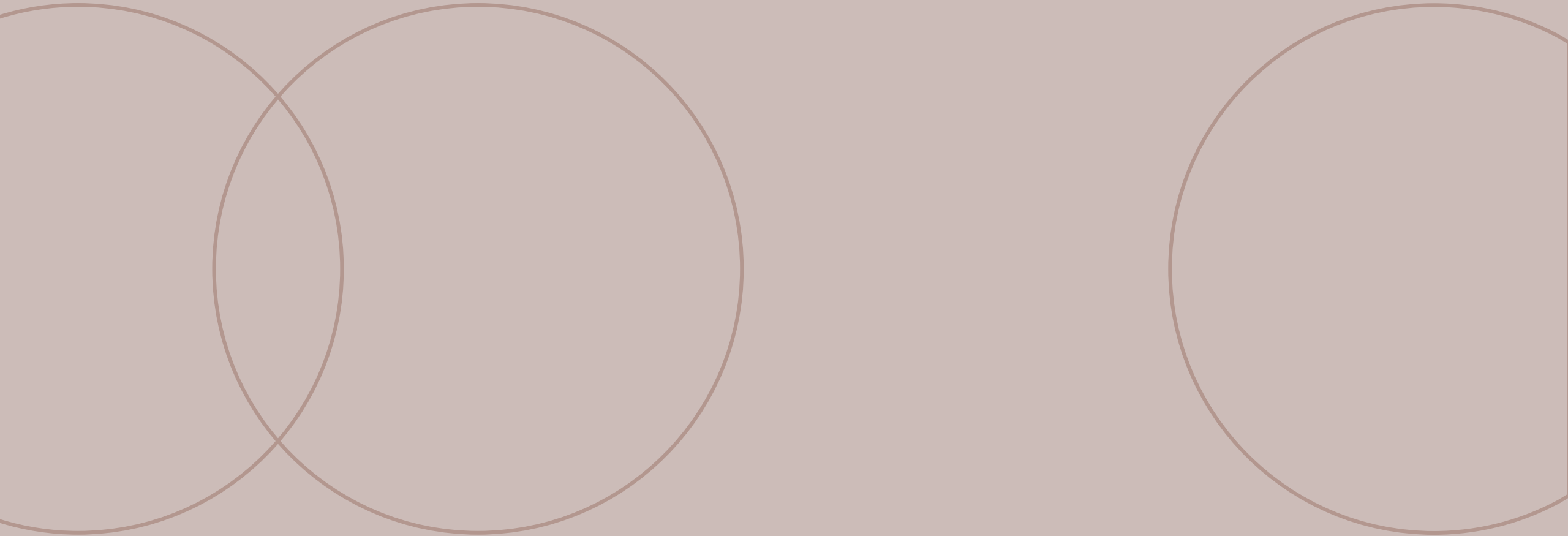
SYN®-AKE

Substantiated product claims

- It helps your face to look relaxed without losing the ability to express yourself
- It visibly reduces deep wrinkles in just 4 weeks
- When used earlier in time, it helps delaying the appearance of wrinkles, with age-freezing effects
- It mattifies skin, visibly reducing shine look
- It improves skin smoothness and flawless complexion for healthy looking skin

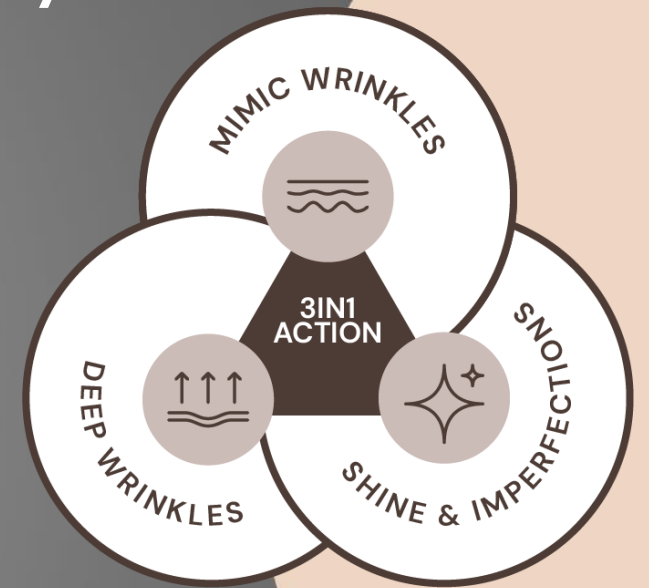


05 Products Line-up



The highly potent, biomimetic tripeptide 3-in-1 "Medical Beauty" Solution

SYN[®]-AKE



For internal use only. Products are for experimental use only and are not for sale.

dsm-firmenich

rewind & regenerate



De-aging daily cream SPF 30

WITH 4% SYN®-AKE,
HYALURONIC ACID-BT

It plumps with hydration and relaxes skin, smoothing the appearance of deep wrinkles for a youthful complexion.

SK-E-101544-3



Restorative night treatment

WITH 4% SYN®-AKE, SYN®-COLL CB,
PENTAVITIN®

This intensively nourishing formula works overnight to relax skin and restore moisture and elasticity.

SK-E-101456-12



Eye serum

WITH 4% SYN®-AKE, SYN-EYE® CB,
PEPHA®-AGE CB

It reduces the appearance of crow's feet, while its unique texture provides an instant flawless look.

SK-E-101456-10



Concentrated serum

WITH 4% SYN®-AKE, SYN®-HYCAN CB,
HYALURONIC ACID-BT

High-tech formula and targeted application to visibly reduce deep wrinkles.

SK-E-101480-4

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